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The FOUNDRY

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JANUARY, 1940

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By—

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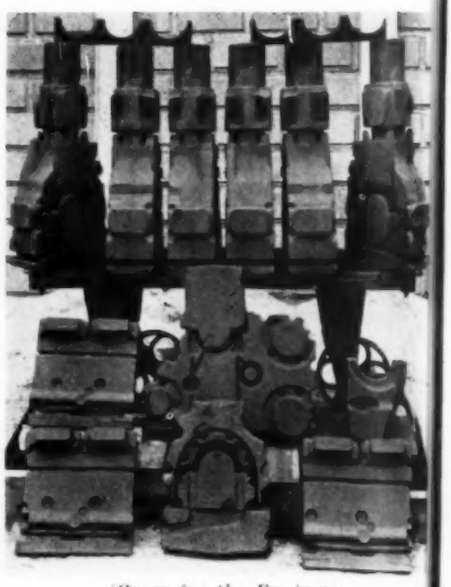

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THE FOUNDRY Editorial

Foundries Anticipate Further Gains During 1940

THE foundry industry begins the new year with a vastly better outlook than was the case a year ago. Improvement in operations was apparent late in the spring and continued steadily throughout the summer. Contrary to expectations, the demand for castings increased tremendously shortly after the outbreak of the European war. During October and November, production of practically all classes of castings was exceptionally high, although the total output for either month probably did not quite equal the tonnage of castings made during the peak month of 1937.

While reports received shortly after the middle of December indicate a slowing down of operations in some lines and in certain sections of the country, the decline in output is not general. Foundries producing castings for machine tools, railroads, agricultural implements, stoves, marine work, airplanes, automobiles and other lines continued good operations into December. Seasonal influences as well as lighter demand for cast parts have influenced the output of foundries, and the relative importance of each is difficult to ascertain.

Enough business is on hand or in prospect for a fair proportion of foundries to operate at a high rate from four to six weeks of the first quarter of 1940. Some shops will be able to continue for the entire first quarter at a rate approaching 100 per cent. Unless buying again is resumed with the turn of the year, the remainder of foundries anticipate some slowing down of operations during the first two or three months. Since studies indicate buyers of castings are carrying only slightly better than normal inventories, the foundry industry will reflect quickly any further upward swing in the business cycle.

Although many foundrymen believe the situation in Europe holds the key for the trend of business during 1940, it should be pointed out that the possibility of any immediate large demand for castings from abroad seems remote, since it is reported that not all English foundries are busy as yet. In all probability, situations at home will have a greater influence over business activity during the coming months. The unknowns include the attitude of congress toward business and the length of the coming session; possibility of repeal and modification of some of the more recent unfair labor legislation; candidates and the victor in the presidential election; improvement in the buying power of much of the population to permit the quick movement of products now in the process of manufacture to the ultimate consumer; good winter and early spring demand for automobiles; continued railroad buying; etc., etc.

Despite the many uncertainties of the situation, foundrymen generally express the belief that the total tonnage of castings produced in 1940 by the four branches of the industry will be somewhat in excess of the output in 1939. Indications point to the continuation of the business recovery which has been under way for the greater part of 1939.

Progress of the Industry

IN WHAT directions has the foundry industry shown greatest progress during the past year?

Answer to that question is presented in an interesting review of expert foundry opinion in the Jan. 1 issue of *Steel*. Comments cover a wide range of developments having to do with plant, practices and products, so that only a few can be mentioned here.

Through research on the application of castings as engineering materials, improvement of foundry practice, further use of alloys, and the greater application of heat treatment and flame hardening of cast parts, the quality of castings constantly is being improved. Willingness to redesign cast parts to meet the requirements of new and stronger types of metals has become an important factor. In that connection, further progress is reported by steel foundries in the use of the cast-welded type of construction.

Trend is toward further mechanization of various foundry operations, and the greater control of all phases of practice, with special emphasis on melting, sand, annealing and heat treatment. Special attention is being given to safety and health campaigns, especially in small foundries, and greater interest is reported in estimating, costing and pricing systems.

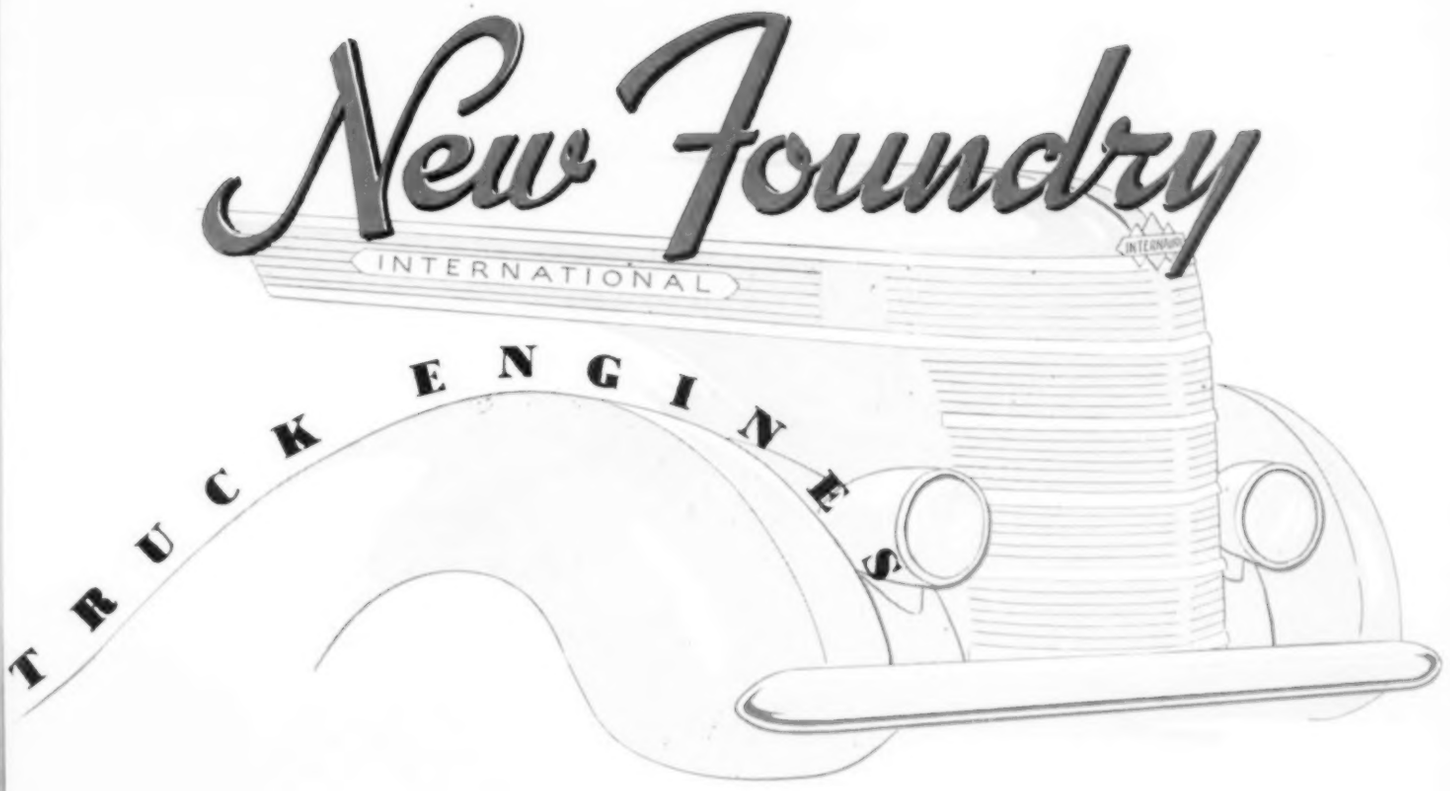
ALL of us on the editorial, advertising and circulation staffs of THE FOUNDRY join in the wish that your New Year may be filled with health, happiness and prosperity.

Frank G. Steinebach
Editor

BUILD

SHEPARD

New Foundry



By PAT DWYER

PROSPECT of a steadily increasing market for a line of trucks varying in carrying capacity from one-half ton to 31 tons induced the International Harvester Co., Chicago, 2 years ago to consider the advisability of building a new plant devoted exclusively to the production of the gray iron castings, and to the machining and assembling of the engines for motor trucks.

For several years the trucks have been built at the Fort Wayne, Ind., and Springfield, O. plants. Engine castings have been supplied by several of the other plants operated by the company. Final selection of Indianapolis as a site for the new plant was based on many factors, including a central location. Initial schedules contemplated the production of 700 engine units per day, with a gradual expansion to an ultimate high of 2000 complete engines every 24 hours.

The company set aside $7,000,000 to finance the project and then set the proper machinery in motion to translate a nebulous general idea into a well oiled and quietly running plant where raw material figuratively is spilled into a nozzle at one end and emerges at the other end in a constant stream of perfectly balanced, smooth, powerful brutes ready for installation on the chassis of waiting trucks.

Many general and minor conferences were held by the engineering, production and planning departments. Every fault charged at any time against features in existing plants, buildings, equipment or methods was brought up and examined. Features which had proved advantageous were scrutinized in a similar manner. Competent men were sent to visit practically all modern plants, to note all essential features in general and in detail.

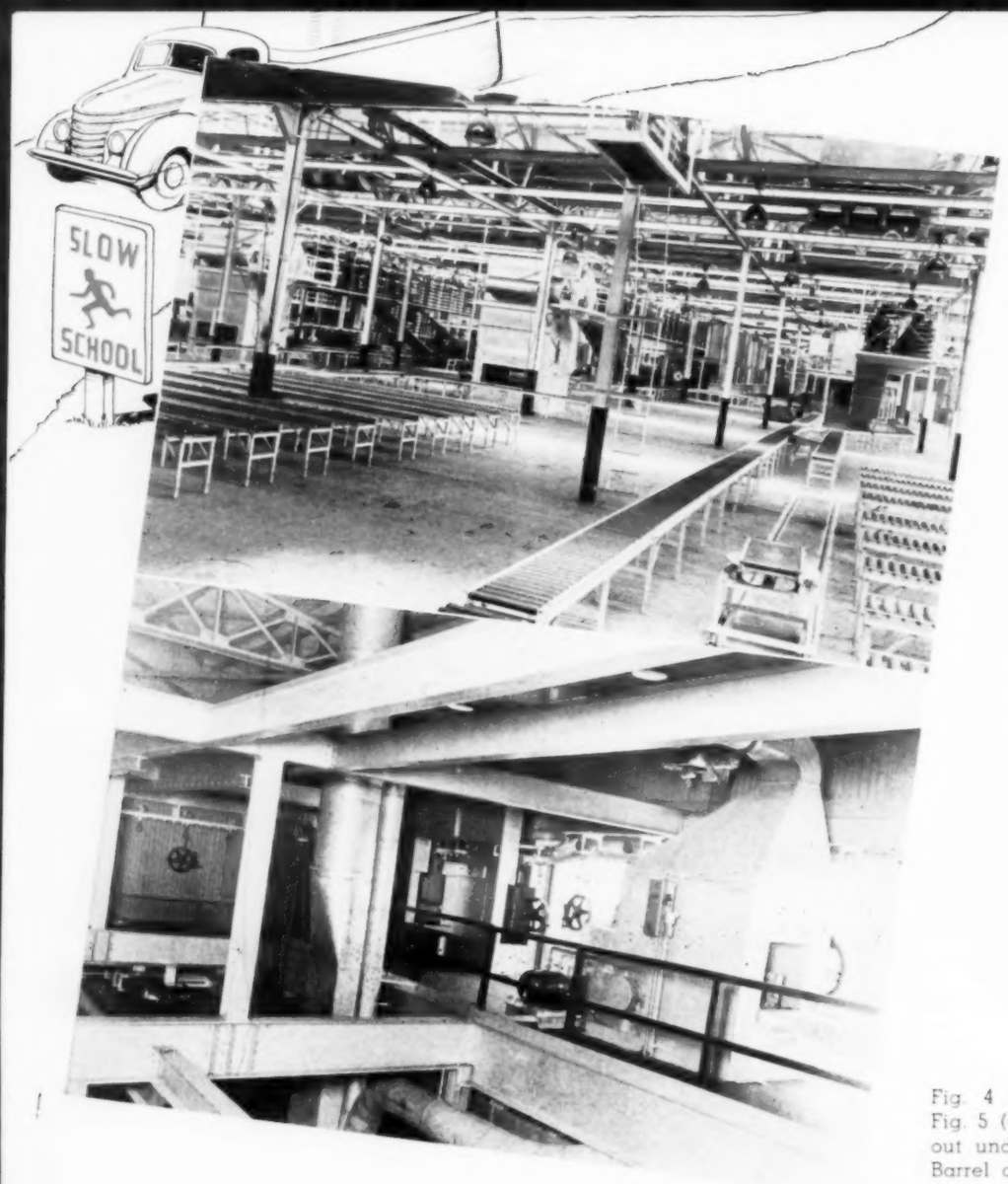
To provide for possible contingencies, including anticipated expansion, the new plant was erected on a 75-acre wedge shape plot of land on the eastern outskirts of Indianapolis, approximately 5 miles from the dominating central Circle containing the largest and most elaborate civil war memorial in any city in the United States.

Part of the plot formerly was a farm and the remainder, a section of the Hawthorne yard, was acquired from the Pennsylvania railroad. In addition to this railroad, the plant also is served by the Indianapolis Belt Line railroad. As at present constituted the plant is made up of four main buildings, foundry, machine and assembly shop, boiler house and office.

In addition to housing official activities, the office building also contains a complete medical department, dispensary, examination room, x-ray equipment, and rest rooms. Each prospective employe is given a complete physical examination before acceptance. Later every device, every practice, every procedure in the plant, functions according to the latest approved hygienic and sanitary standards to prevent accident or sickness.

Further general features of the plant with details of machining and assembling operations, while extremely interesting, lie outside the scope of the present

Fig. 1 (Above)—Hopper at right holds wet sand to be delivered to dryer. Small hoppers at left hold dried sand. Fig. 2 (Center)—General view of plant, foundry at right. Fig. 3 (Below)—Hot metal carrier delivering molten iron to a mold pouring ladle near a large building unit

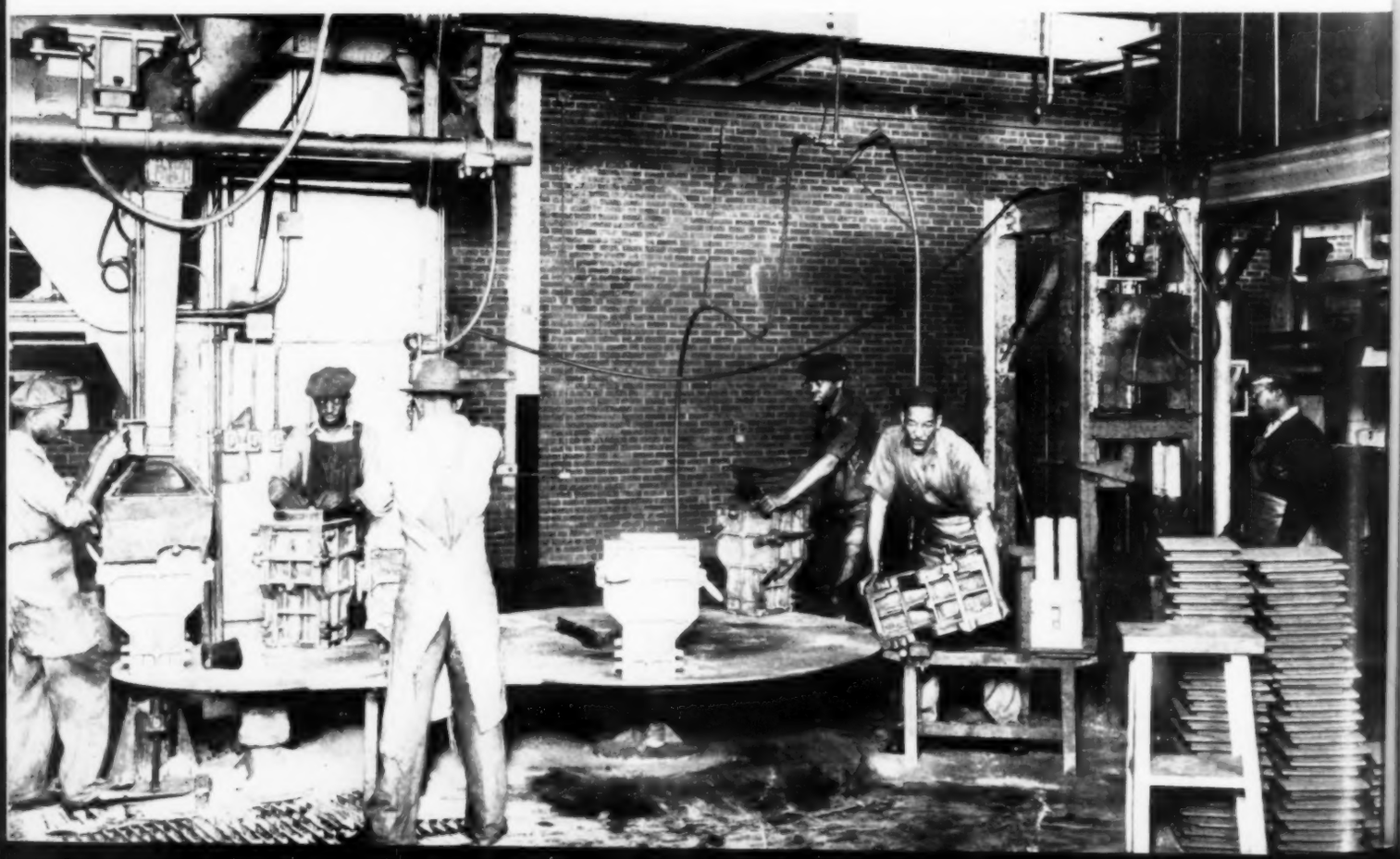


description confined to the foundry, in this instance representing the peak of foundry design and accomplishment up to the present.

The International Harvester Co. with 19 plants in the United States and Canada and with assembling and distribution establishments in every country in the world where edible grain is grown and harvested, has long experience in foundry practice and operation. Experience is based on a continued existence since Cyrus McCormick established his first plant in Chicago in 1847. A stickler for accuracy might even go further and claim that the history really should commence in 1831 when young McCormick, unknown in a Virginia valley, secured a patent on a mechanical reaper.

His biography shows that on several occasions he had to speak severely to outside firms under contract to supply parts for the machines. His reputation and the success of the reaper depended on performance. He insisted on the very highest class of material and work-

Fig. 4 (Above)—General view of core room. Fig. 5 (Center)—Motor block cores are knocked out under an exhaust hood. Fig. 6 (Below)—Barrel cores are made under sand slinger unit and dipped in blacking tank at right



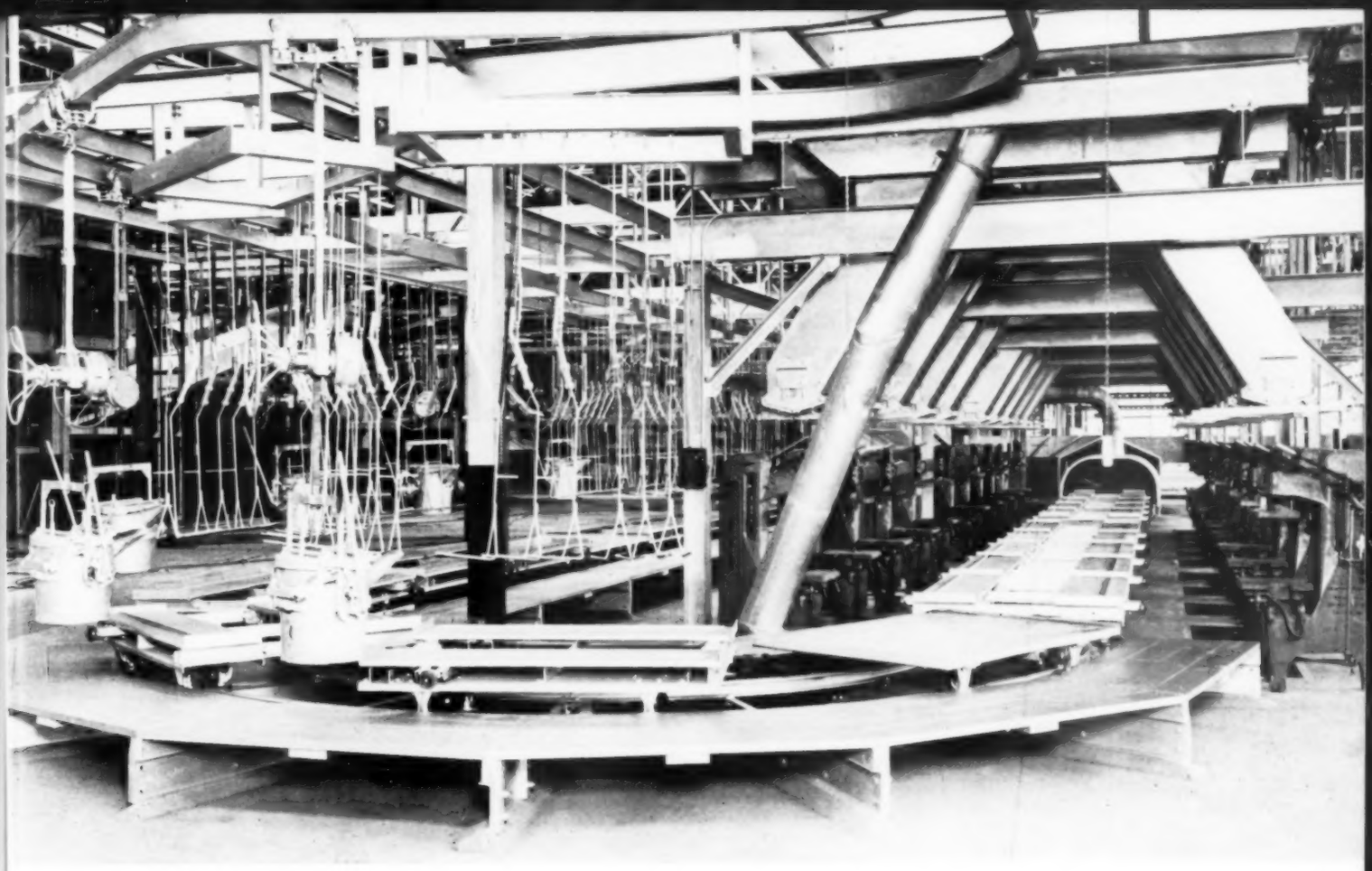
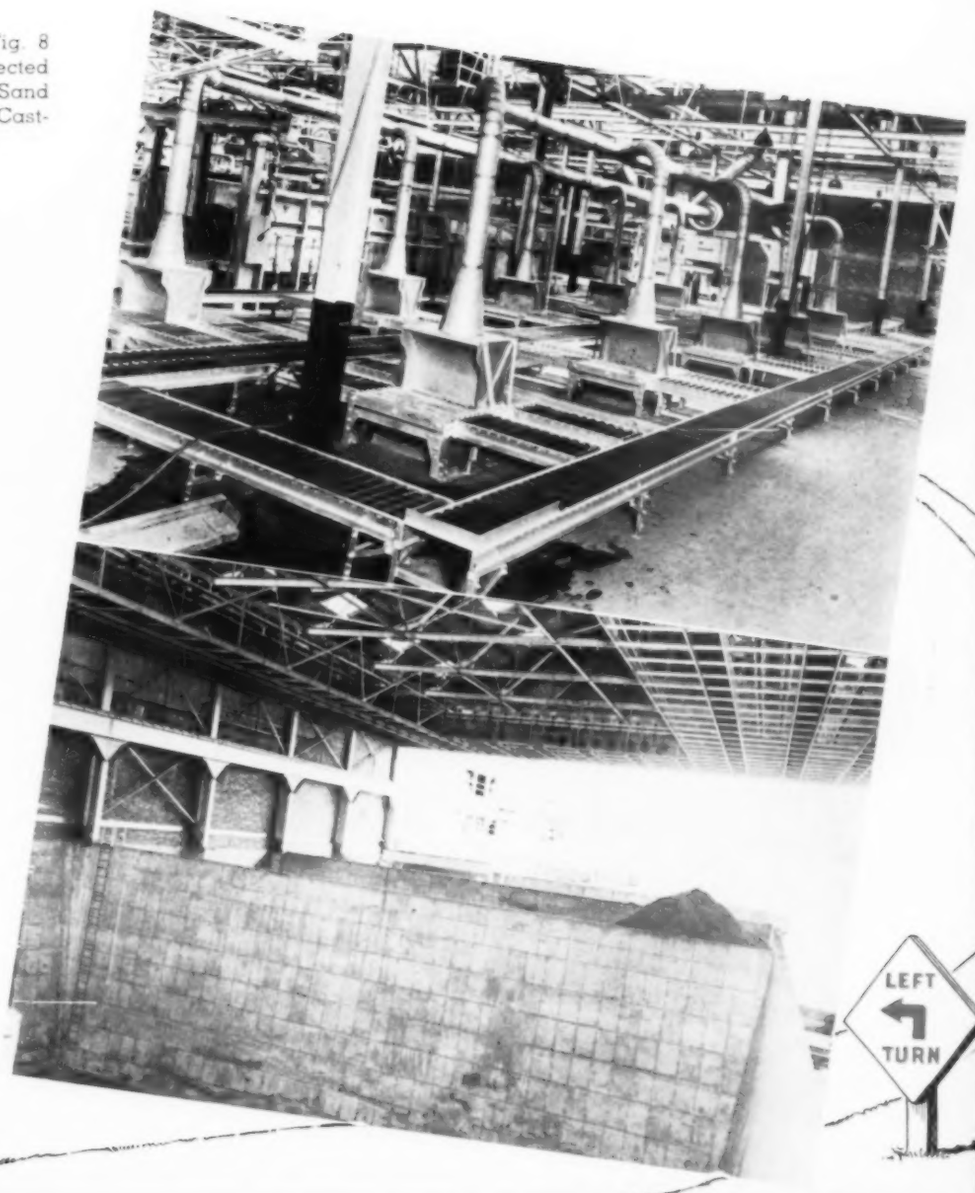


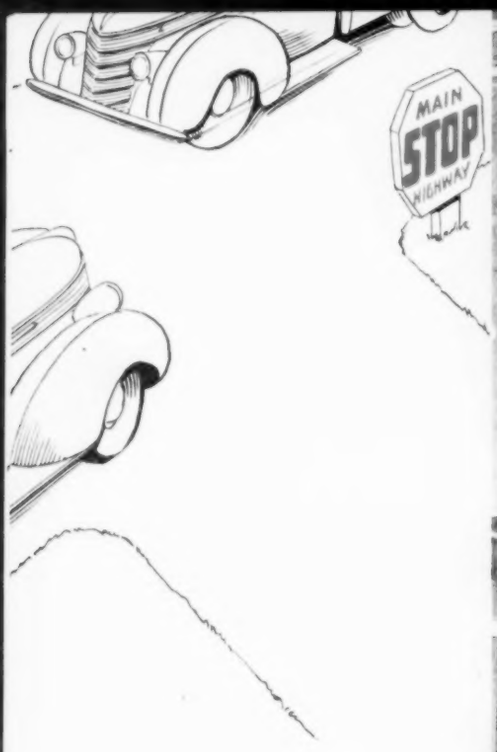
Fig. 7—One of the small molding units. Fig. 8 (Right)—Chipping booths in mill room connected to an exhaust system. Fig. 9 (Below)—Sand storage bins with capacity of 22,820 tons. Casting cooling chains travel overhead



manship. The policy was adhered to strictly after the company commenced making its own castings, during the lifetime of the founder. Later it was maintained by directors of the company who have guided the business for the past half century.

This digression is introduced merely to show some of the background behind the new plant. It was designed and built not as an experimental laboratory, or a place to test more or less radical or intangible theories, but was set up by experienced men in the same manner that any piece of machinery is set up in the full expectation that it will function satisfactorily when completed.

Tentative foundry plans, subject to change at a moment's notice, were completed in the fall of 1938, and excavating for the foundations was commenced in December. An army of nearly 1000 men swarmed into the place. Materials and equipment poured in by the truck and train load. As a result of all of this



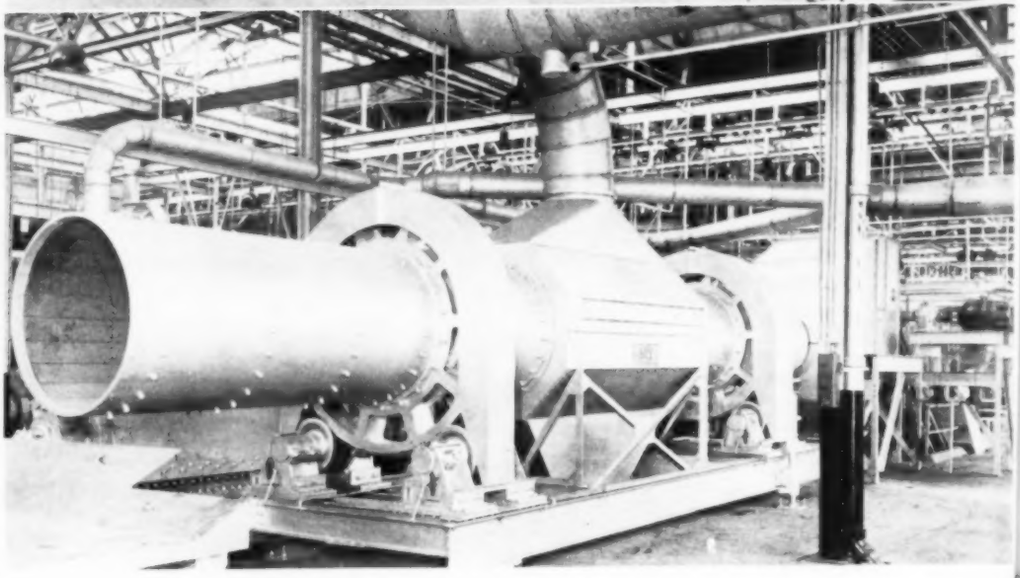
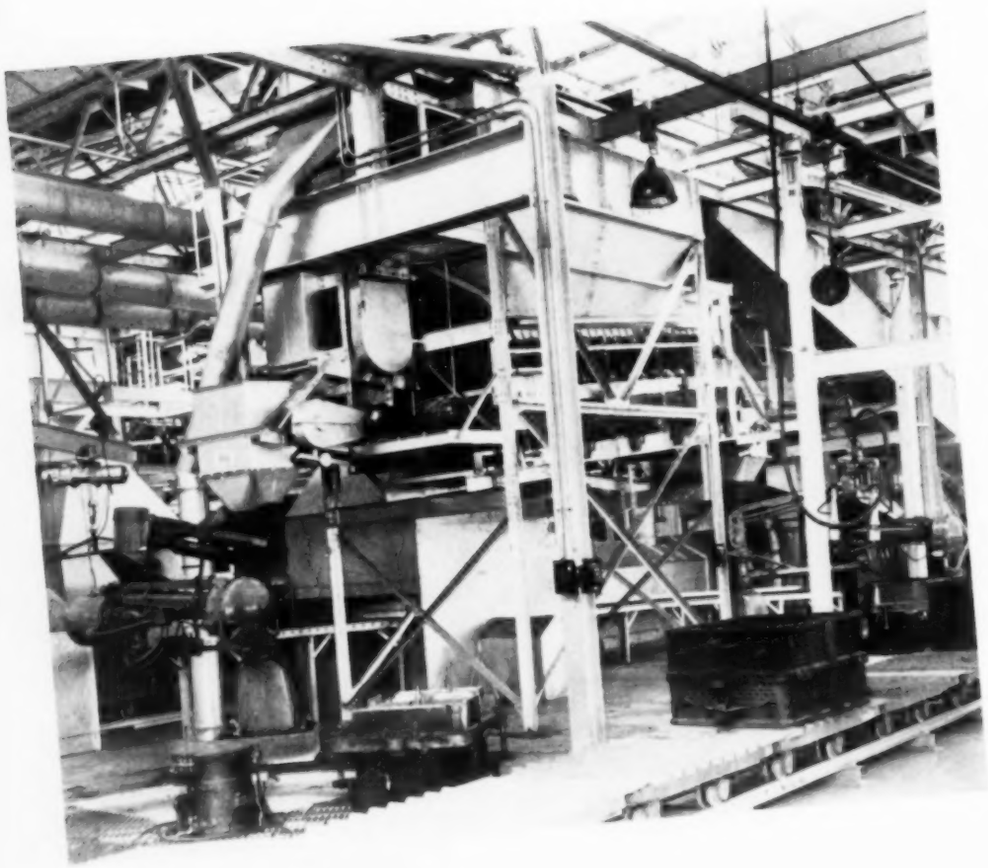


Fig. 10 (Above)—Mixing ladles in front of cupola spouts. Fig. 11 (Right)—Cooling barrel for castings made on unit shown in Fig. 7

Fig. 12—Partial view of one of the larger molding units showing pattern turntable, sand slinger, sand tower and mold conveyor



activity, expert supervision and earnest co-operation of outside manufacturers of equipment, the foundry went into production in July, 1939. Not on a maximum scale, because while the supervisory staff is highly efficient, it lays no claim to miraculous power. Practically all of the employes were recruited locally.

The process of converting a man without any former knowledge of foundry practice into a skilled and rapid performer, a unit in a group which functions in unison and harmony, can not be accomplished over night. Remarkable results of the efforts of the management and supervisory force are reflected in a report of the first four months operation. Commencing in July with an output of 80 units, production advanced steadily. At the close of November, the foundry was delivering 600 complete sets of engine castings to the machine shop every day.

Practically from its inception the company has pioneered many trails, including those connected

with the production of castings. Extensive research work ever has been regarded as an important and necessary factor in the general program. In many respects this new foundry epitomizes the evolution of the foundry industry during the past 30 or 35 years, a gradual change commencing with the adoption of the molding machine and followed by the introduction of mechanical equipment for sand handling, conveying molds and cores, charging furnaces, cleaning castings, and many other applications.

This is strikingly illustrated in the amount of space devoted to molding as compared with the floor space devoted to other related activities. Under former conditions every mold occupied a certain amount of floor space and provision had to be made for the entire day's production. Under modern mass production methods, molds are made and poured continuously on conveyor units. In this manner the avail- (*Please turn to page* 84)

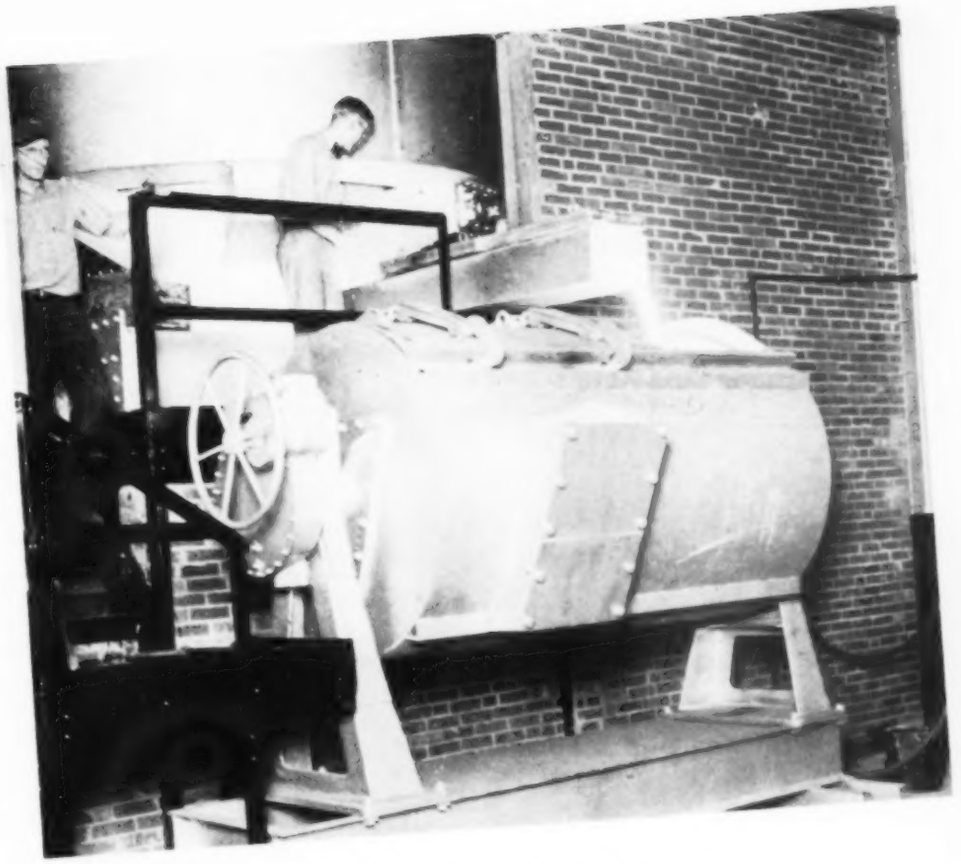
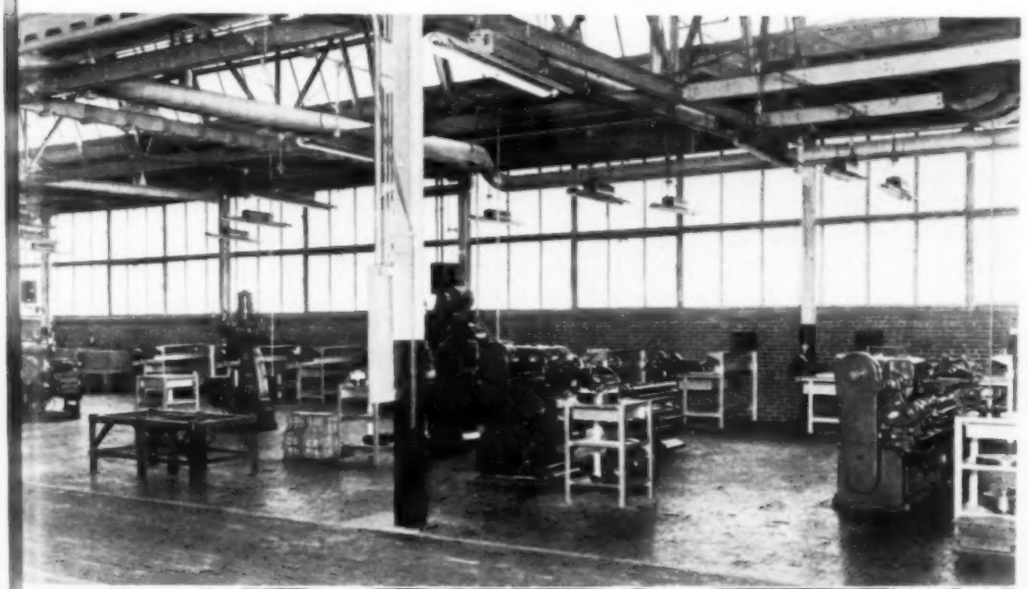


Fig. 13—A 5-ton capacity mixing ladle covered and insulated receives the metal as it is tapped from each of the four cupolas



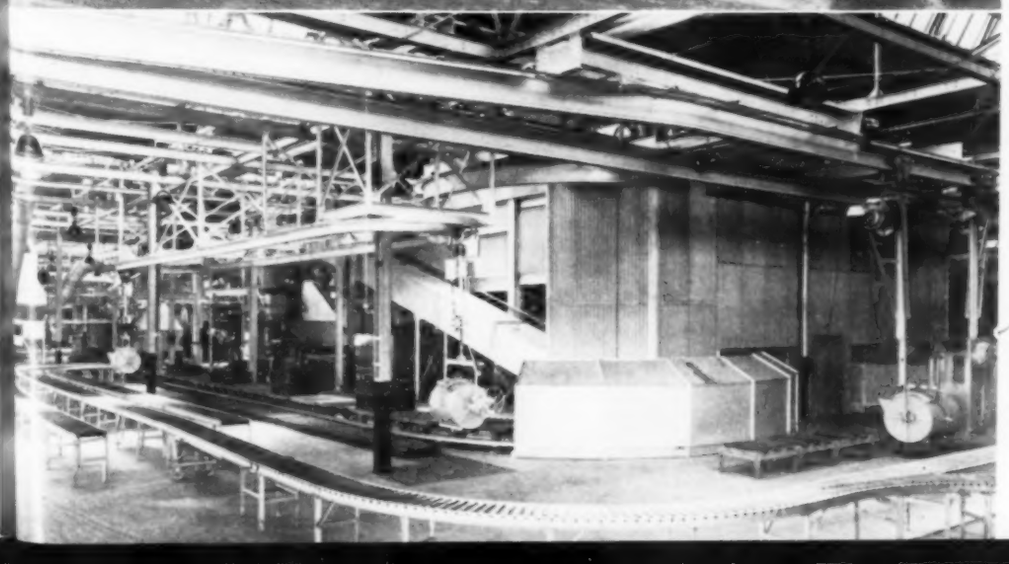
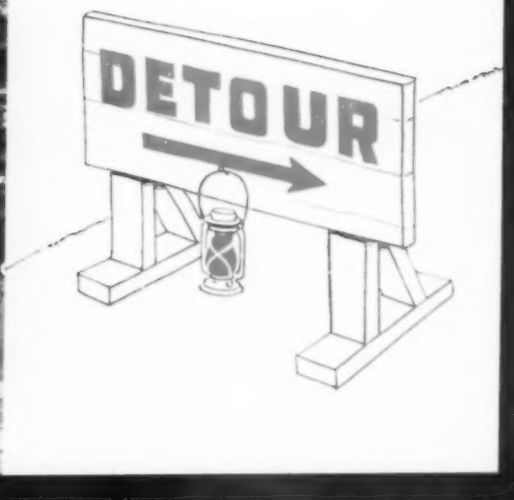


Fig. 14 (Left)—One section of the pattern shop is equipped for handling metal patterns. Fig. 15 (Below)—One of the large molding units with core conveyor at left and part of sand conditioning tower at right



Cast

By
J. A. SHUFFSTALL
Assistant Manager
National-Erie Corp., Erie, Pa.

Fig. 1—Dry sand cores are fitted into prints to form the teeth

CAST tooth gears present more or less of a problem to the jobbing steel foundryman in pattern construction, molding technique and other phases of manufacture. The usual practice has been to construct the conventional type of pattern with the required number of teeth and proper profile, according to the customer's drawing and specifications. Removing the pattern from the sand necessitated at least nominal draft on the teeth, even though this feature was objectionable to the gear engineer who claimed that the meshing gears did not have full bearing contact. In some instances the pinion was reversed in relation to the draft of the teeth on the gear. However, this always was not satisfactory. In many instances cast tooth gears and pinions are not symmetrical about horizontal center lines.

Secure Sand Teeth in Mold

The first problem confronting the foundrymen when placing the typical cast tooth gear pattern in the sand, is that of molding and securing the sand pockets which form the tooth spaces. Gears with extremely wide face require substantial securing of teeth with rods or gaggers. This is detrimental to the casting. These pockets when secured excessively reduce the permeability of the sand, and result in penetration of the molten metal against the sand particles forming the surface of the tooth space. In addition to that obstacle, the practice raises a drying problem.

When the mold is placed in the oven for baking at the proper drying temperature, it is reasonable to expect that the teeth, the sand pockets which project, will dry out much more rapidly than the bodies of sand forming the background of teeth and base of mold. Pouring molten metal in a mold dried in that manner is liable to draw moisture and cause a porous condition in the casting usually on the drag side. If the mold is dried thoroughly to the point where all moisture is absorbed, the teeth are subjected to too much heat and the sand will be burned. Effort to save a mold of that kind often requires considerable repair work and patching of teeth, which usually results in a casting containing an abnormal amount of fin and scrap, thus penalizing the cleaning department. In many cases teeth are deformed and the casting is rejected.

May Utilize Existing Patterns

Modern foundrymen have adopted new manufacturing processes including proper pattern construction to eliminate the difficulties outlined. To meet competition, the average jobbing foundry has acquired a large assortment of gear and pinion patterns of the blank type used in cut teeth gearing. Therefore, in most cases the plant is in position to select a blank gear pattern within the approximate dimensions of the cast tooth gear specified. This convenience and foresight eliminates the cost of constructing an entirely new pattern. With a few slight alter-

Steel Gears

Figs. 2, 3, 5, 8, 9 and 10 show various details of tooth formation. Fig. 4—Detail of hook for holding shrouded pinion tooth core in place. Fig. 6—Suitable block in corebox forms seat for the hook. Fig. 7—Cross section of mold with center core and teeth core in place. Fig. 11—Typical tooth corebox

tions the blank can be prepared to produce a cast tooth gear of any pitch within standard requirements by adding shallow core prints to the correct outside diameter of the pattern. In most cases the width of these core prints is the exact dimension of the tooth space on the outside diameter circle.

The pattern shop constructs an individual core box producing the exact shape of the tooth space plus the thickness of core print. Thus a single corebox takes the place of a complete set of teeth required when constructing the conventional type of cast tooth pattern. For instance in the conventional type gear of the following dimensions: 4½-inch circular pitch, 95.9711-inch pitch diameter with 67 identical teeth, the pattern would require the construction of 67 identical teeth.

In addition to the extremely reduced pattern expense in the single tooth method, it is possible to produce a casting with teeth absolutely uniform and square. Although it is necessary to allow a slight amount of draft on the outside, the tooth profile at

pitch line is absolutely square, allowing proper amount of backlash and full bearing contact. The slight draft on the outside of the tooth is unimportant as the engineers have provided sufficient clearance on centers to prevent any tip interference.

If warranted, coreboxes may be constructed in multiples although the cores are to be used individually. Multiple corebox equipment would increase efficiency and maximum production in the core department with any sand mixture desired, which usually is of a high silica content. The core requires little or no rods or wires, thus automatically increasing permeability. Cores may be dug out or lightened in the center to guarantee collapsing of core when surrounded by molten metal. This method also provides free venting. Gas escapes readily, resulting in a smooth surface cast accurately to shape and in addition the cores are removed easily.

Core Prints Tapered and Drafted

Suspending the cores in the mold does not require any special supervision. The core prints are tapered or drafted on both the face and sides. Removing the pattern does not tear or deform the prints. The core print portion of core box conforming accurately to the dimension of core print on the pattern provides a slight clearance for mold washes and foundry variation caused by the swelling of baked molds and cores.

In some instances particularly on cast tooth shrouded gears and coarser pitches where there is a possibility of the core moving, due to pressure during the pouring process, it is necessary to tie cores to mold. A print for an eye or a hook is located permanently in corebox near the cope end as shown at *A* and *B* in Fig. 6. A telltale fixture corresponds accurately to a mark or indentation on the pattern core print. A shallow projection of the core print on the drag side of the pattern provides a seat for the core which will not allow it to move at that location. The core is tied back against the mold near the cope end.

In this manner the cores are spaced securely and accurately. Although adding to core making cost and a certain amount of work on the dry floor, the cost is minor compared to the substantial saving of molding time. A saving also is effected in the cleaning department, starting at the shakeout. With no complication of nails, rods or wires, the casting parts easily from the mold and the core sand between teeth is removed with ease.

Three Part Mold Eliminated

The method is particularly adapted to shrouded cast tooth gears and eliminates entirely the complicated and difficult molding job known as cheek molding which usually requires special flask equipment, special handling and special supervision in addition to a difficult drying problem, an abnormal amount of dry floor work, and the increased possibility of shifts and variations.

In comparison with machine molded gears the reduced cost of pattern construction is comparatively the same providing the source of manufacture, particularly the jobbing foundry which operates a gear cutting shop in conjunction with steel foundry, maintains an elaborate assortment of stock gear patterns, from which a selection may be made to suit the average gear requirements. However, with the machine molding process, the foundry still is confronted with the drying problem in addition to decreased permeability of molding sand and special flask equipment. Molding and core costs are increased as the machine only makes the tooth. Various designs of gears, spoke arm, cross (*Please turn to page* 92)

Large internal ring gear is molded in green sand with individually cored teeth

National Founders CONSIDER PROBLEMS of BUSINESS

William D. Hamerstadt
President

TRENDS of national importance which affect materially the problems of foundry management were discussed by various speakers at the forty-third annual convention of the National Founders' association held at the Waldorf-Astoria hotel, New York, Nov. 15 and 16. An exceptionally large attendance was attracted by the splendid program.

William D. Hamerstadt, Rockwood Mfg. Co., Indianapolis, was elected president of the association at the annual business session. D. C. Bakewell, Blaw-Knox Co., Pittsburgh was named vice president, and J. M. Taylor, Chicago, was re-elected secretary-treasurer A. E. McClintock, Chicago, was reappointed commissioner by the administrative council of the association.

Cautions Against Over-Expansion

Frank R. Hoadley, Atwood Machine Co., Stonington, Conn., in his presidential address, cautioned foundrymen against over-expansion of plant facilities. One sad lesson of the World war should teach caution. Millions of dollars were sunk in bricks and mortar at that time, where in many cases temporary construction would have served the purpose. "Expansion of plant or equipment should adapt itself to regular lines of manufacture after the war is over, or it should be amortized over a very short period," according to Mr. Hoadley.

Management should re-double its efforts in the training of mechanics to ameliorate the scarcity of skilled help which now prevails. This he termed a national necessity and extremely vital to national defense. Mr. Hoadley congratulated American business leaders upon the clean and unmistakable expression of opposition to war. This, he said, belies the demagogue who would seek again to blame industry for war, as he has blamed it for most of the world's ills.

May Establish Business Control

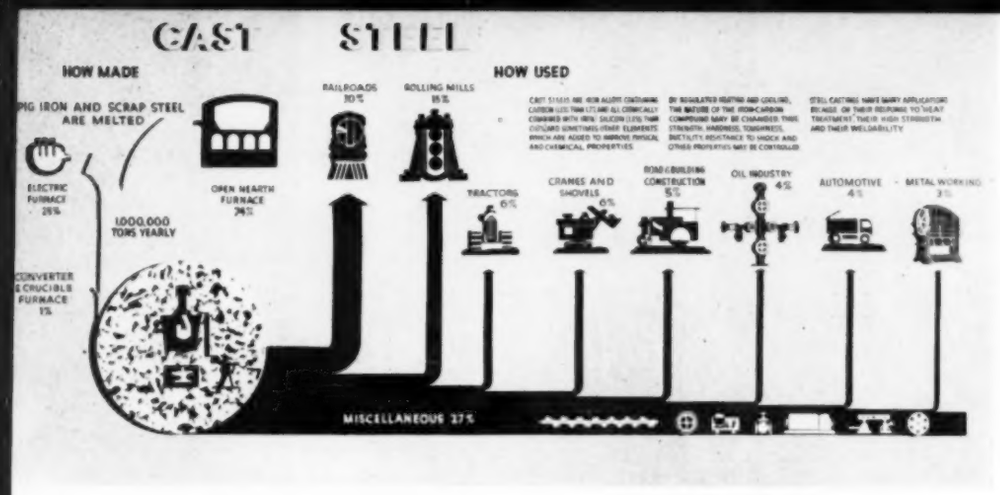
Indications are seen by Mr. Hoadley that the intent in Washington, in case America is again called upon to mobilize its war resources, is to use the emergency as a means of establishing permanently a degree of control over business not contemplated during the last war. "This program has been frustrated by the last two sessions of congress, but there are signs it will be pushed again with much more vigor than ever. Should such a program come to pass the American businessman will really have something to worry about."

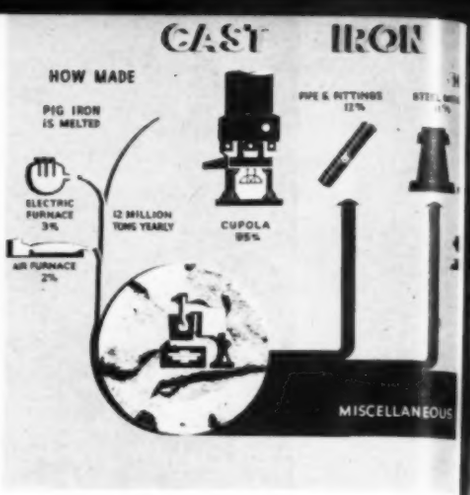
Repeal of the national labor relations act was urged by Commissioner A. E. McClintock as essential to improvement of industrial re- (*Please turn to page* 97)

J. M. Taylor
Secretary-treasurer

A. E. McClintock
Commissioner

D. C. Bakewell
Vice President



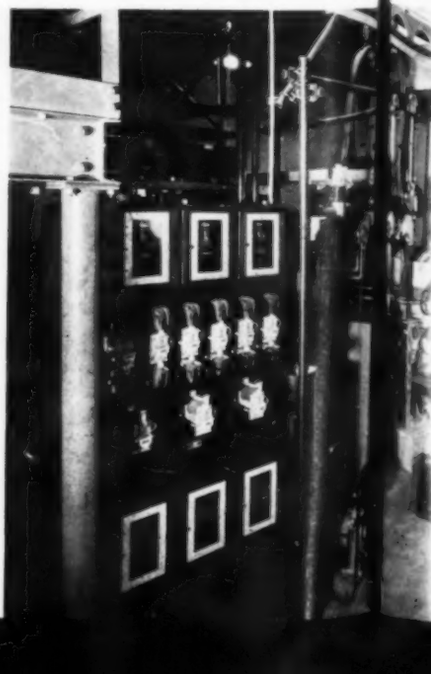


Three interesting charts, which form a part of the castings display at the Museum of Science and Industry, are illustrated above. These charts, which were prepared following considerable statistical research on the part of the museum staff, illustrate method of making raw materials, how they are melted, and the proportionate use to which the products are put

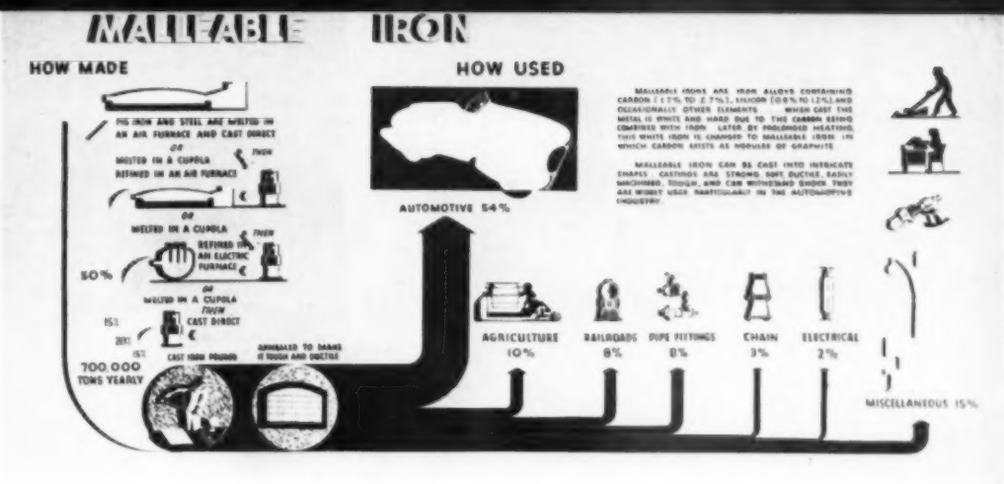
OPERATING exhibit of the foundry industry, in the Museum of Science and Industry, Jackson Park, Chicago, and dedicated Nov. 9 to 11, during the second regional foundry conference of the Chicago Chapter of the American Foundrymen's association, will be opened to the public sometime in January, depending on the completion of the other exhibits in the Museum Hall of Metals. The foundry division of the display includes a modern, air conditioned, glass enclosed foundry with full sized working equipment. Numerous displays of castings, cores, molds and supplies used in the manufacture of castings, flow charts of raw materials to finished product, as shown in the accompanying illustrations, add greatly to the educational value of the exhibit.

Completion of the exhibit climaxes over 3 years conscientious effort by the museum exhibit committee of Chicago chapter of the A.F.A., and the executives of the museum. To be complete, museum curators years ago realized that the museum exhibits should include a display of foundry equipment. To assure authenticity, the museum authorities consulted a committee of prominent foundrymen. In July 1936, C. E. Westover, Burnside Steel Foundry Co., Chicago, was appointed chairman of that committee by James L. Wick Jr., then president of the A.F.A.

Later it was found advisable for the committee to function exclusively through the Chicago chapter, because of its proximity to the museum. Since first appointed the committee has remained intact with the following members: W. L. Hartley, Link-Belt Co.; A. C. Christensen, National Engineering Co.; Harold Johnson, Greenlee Foundry Co.; W. R. Bean, Whiting Corp.; Harvey W. Payne, Harvey W. Payne Co.; and Chairman Westover, at present chairman of the Chicago



As shown at the left above, the exhibit is located behind a glass partition. Two views of the operating equipment are shown at the right. It is expected that souvenir castings will be produced when the unit is thrown open to the public in the near future



By J. F. POWELL
Chicago Editor, The Foundry

chapter. Although the exhibit is completed for the present the committee will continue to function to keep the display of equipment up to date.

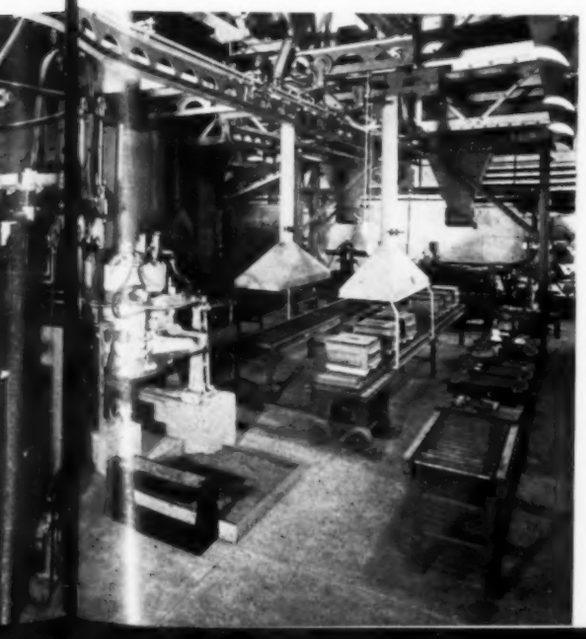
The exhibit occupies almost the entire gallery of the main section of the Hall of Metals, while on the main floor a large working model of a foundry sand-handling and conditioning plant is displayed, as well as close to 600 samples of sand collected by the late Eugene Smith Sr., the Crane Co., Chicago.

First exhibit in the gallery shows steps in the casting of bronze placques which adorn the huge bronze cast main doors of the museum building and represent its various departments. In connection with this, there also is a display of the lost wax method of casting statues.

Three 4 by 8-foot flow charts, show production methods and principal uses of cast iron, steel and malleable castings, with specimens of each. The cast iron exhibit is sponsored by the Gray Iron Founders' society, Cast Iron Pipe Research association, and Association of Manufacturers of Chilled Car Wheels. The steel castings exhibit is sponsored by the 6th division, Steel Founders' Society of America, and the malleable display is sponsored by Malleable Founders' society.

The Ford display with actual molds, patterns and cores shows the intricacies involved in casting V-8 motor blocks. Adjacent (*Please turn to page* 82)

MUSEUM Has Finest OPERATING *Foundry Exhibit*



PRODUCING CAST IRON FOR *Enameling*

By T. G. JOHNSTON
Metallurgical Engineer
Republic Steel Corp.
Cleveland

WHILE concerned primarily with a description of cast iron adaptable to the enameling process, a brief reference to the general subject of pig iron manufacture may be appropriate. To produce iron to meet present day specifications, it is necessary to use not only the proper quality raw materials but to consider other features, equally important, including proper size of coke and ore, accurate weighing of material charged in the blast furnace, even distribution of the charge, careful control of blast volume and pressure, temperature control.

The blast furnace operator keeps a careful check at all times on operation of the furnace. Any change in analysis of iron is checked with record of charts of day's operation. There is not the problem of producing iron which does not meet the requirements of grades for which furnace was burdened as in early stages of furnace control, when iron was graded and sold on fracture basis.

Iron Meets Exacting Requirements

Iron is tapped into large mixing ladles, to promote uniform analysis of the cast. Skimming devices remove the kish which separates from iron in mixing ladle. Cast iron pig molds surface chill is reduced to minimum by indirect cooling. The resultant product, clean, uniform sized pigs, enables the foundry operator to purchase iron to suit his individual requirements.

Cast iron is a more complex metal than ordinary steel. Composition includes the elements: Silicon, sulphur, phosphorus, manganese, graphite and small amounts of alloys such as nickel, chromium, vanadium, titanium, copper and arsenic. Some of these cause trouble in cupola mixtures for iron to be enameled.

While there are no standard specifications of iron used in mixtures for enameled castings, it is necessary to have an iron which will enamel with least loss from defects in finished product. The following limits have been found to meet the requirements for most castings enameled by either the dry or wet process: Silicon, 2.40 to 2.65 per cent; sulphur, 0.06 to 0.09 per cent, phosphorus, 0.65 to 0.80 per cent; manganese 0.35 to 0.55 per cent; total carbon 3.30 to 3.50 per cent.

Iron Has High Carbon

While some operators may differ with these limits, the majority have found through experience that a mixture with silicon on the low side and total carbon on the high side give best results in the enameling department. Opposite conditions may prevail in another plant. The same is true with phosphorus and manganese. Sulphur and carbon usually are dependent upon amount and type of scrap used, sulphur content of coke, height of coke bed, weight of coke per charge and cupola operation.

In cupola operation various factors must be controlled to suit equipment to be used, diameter of cupola, depth from charging door to tuyeres, tonnage required per hour, cupola blower, design of shop and distance necessary to carry molten iron to molds. To obtain most efficient operation in a cupola a good dense coke should be used, with ash content not to exceed 9 per cent or preferably lower. The lower the ash content the greater the carbon pickup in melting operation and higher temperature with less coke per charge.

The coke bed should be high enough to insure melting of metal charges in that section of the cupola where there is no free (*Please turn to page* 90)

AVOIDING DEFECTS in the Nonferrous FOUNDRY

By N. K. B. PATCH

A PRECEDING article published in the December issue of THE FOUNDRY covered several causes of defective nonferrous casting with suggested remedial measures including pattern equipment, molding equipment and mold setting.

Gating of castings, of course, is one of the major elements in the production of good castings and erroneous gating or inadequate or misplaced gates may be the source of defective castings. Too often foundrymen jump to the conclusion that they can correct a foundry trouble by changing the gate or by locating the gate in a different way without having given the defective castings a sufficiently careful analysis to determine the exact cause of the defect, or to determine definitely the necessity of changing the gate, or of altering some other condition.

Where castings are to be made on a mass production basis, gating should be studied carefully before it is adopted finally for application to the pattern equipment for molding machine operation. Experimenting with different types of gates frequently will help if experiments do not delay production unduly, or raise the cost too high. Previous experience with castings of a similar design, if properly studied, will guide one in selecting the right gate for a new casting. Proper compensation is made for difference in cross section and for difference in the location of heavy sections relative to light ones. Where the casting has to be fed after it is poured, provision has to be made in gating for proper location of necessary risers and their connections.

Riser Necessary To Feed Casting

Gating is a combination of two or more things. The gate is what might be known as the necessary evil, necessary to provide a channel through which metal may enter the mold cavity. After this has been done, it would be far better if there were no gate. The riser, which might be considered part of the gating system, must be there. Connection from the riser to the casting must be there since definite provision must be made for the flow of metal into the mold cavity as the metal therein shrinks during its cooling process.

Frequently gates demand feeding metal as they cool. Since they set before the casting, they draw their feeding from the casting, resulting in shrink holes where the gate and the casting join. Such a condition must be compensated for in the size and shape of the gates and necessary risers in some instances.

While considering castings defects resulting from faulty gating, it is well to remember that these defects closely resemble defects that result from other causes. The most common defect resulting from improper gating is shrinkage. The metal may enter the mold at a wrong location. The gate has drawn metal from the casting and the riser has not been in the right location to replenish the casting with fresh metal. Folds, or cold shuts or seams frequently are caused by improper gating where restriction of flow is caused by gates inadequate in size or number. A consequent chilling of metal prevents complete knitting where two or more streams meet in the mold.

The same condition might be brought about by pouring the metal at too low a temperature. Sand holes may result from bad gating where gates are not properly filleted. Loose sand may be washed from them into the mold cavity. Inadequate fillets at the junction of gate and casting result in sharp corners that wash away with the inrush of metal. Sand thus washed away is lodged at some point in the casting. Gates may be badly designed to resist the inrush of metal down through the sprues whereby sand is loosened and carried with the stream of metal into the mold.

In some of the nonferrous metals the gates may cause a serious series of defects known as scum spots or smoke spots in the yellow brasses, or scum spots or the like in aluminum bronzes and silicon bronzes. These gates produce a spraying effect. The metal sprayed into the mold cavity (*Please turn to page* 88)

QUESTIONS AND ANSWERS

Wants to Purchase Permanent Mold for Sash Weights

Where can we purchase special cement or concrete permanent molds for the production of standard sash weights and soil pipe castings? Can you recommend a special cupola lining for melting steel scrap, or do you advise an oil furnace for this purpose? Where can we purchase an oil furnace? How does the cost of operation compare with a cupola burning coke?

From the general tenor of your inquiry we gather that you have been misinformed on the subject of molding and melting. Cement bonded sand is employed for making molds, but the molds are not permanent. They are destroyed after each cast the same as ordinary sand molds. The process which present certain advantages, is known as the Randupson process. Full particulars may be secured from the Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa. A full description of the process was presented in the December 1935 and January, February, and March 1936 issues of THE FOUNDRY.

At various times we have published accounts of individual attempts to cast sash weights and soil pipe in permanent iron molds. However, for one reason or another the attempts were abandoned and these castings now are made almost exclusively in the ordinary type green sand molds.

Recently a firm in the South has been experimenting with the centrifugal process for making soil pipe castings in metal molds lined with sand. A description of the process is presented in the September, 1939, issue of THE FOUNDRY. This method, known as the sandspun process has been used extensively for several years in the production of standard gas and water pipe castings. No special lining is required in a cupola melting steel scrap. Provided the cupola is operated properly it will melt steel scrap as readily as pig iron or cast iron scrap. For that matter, the cupola also has been used to melt brass and bronze. Choice of cupola or oil burning furnace hinges principally on the quantity of metal handled. For comparatively small amounts the oil furnace presents certain advantages, but up to the present the cupola has proved to be the most economical melting device in the ferrous field. For complete information on furnace installation and operating cost we refer you to the various manufacturers as listed in the advertising pages of THE FOUNDRY.

Bronze Alloy Does Not Meet Physical Requirements

We tried a recommended mixture containing 88 per cent copper, 6½ per cent tin, 1½ per cent lead and 4 per cent zinc to meet a specification of 34,000 pounds per square inch tensile strength and an elongation of 22 per cent in 2 inches. However, we only could obtain a tensile strength of 27,600 pounds per square inch and an elongation of 12.8 per cent in 2 inches for a test bar. Any suggestions will be appreciated.

The specification of 34,000 pounds per square inch tensile strength and 22 per cent elongation should not be hard to meet with almost any of the usual alloys of copper, tin and zinc, provided the lead content is not too high to interfere with the elongation. Such an alloy as that specified should yield easily 40,000 pounds per square inch tensile and a fairly satisfactory elongation up to 20 per cent. If the lead content were dropped to 0.75 per cent, an elongation of up to 25 or 28 per cent should be a simple matter. Metal must not be gassed in the melting. The test bar should be cast as specified in the federal specifications, that is, cast approximately to size allowing for a minimum amount of finish so that the good metal would not be removed by machining to size. Pouring temperature influences the physical characteristics and, therefore, it should be maintained within the proper limits.

Proper test bar design may be found in one of the federal specifications. Care should be taken that the junctions of the web and the test bar are well filleted. Also where the web joins the riser there should be an ample fillet. These fillets tend to help the riser to function as a feeder and if the test bar is not fed, results will not be satisfactory.

The metal should enter at the end of the test

bar through a runner that is provided, preferably with a good shape to insure the metal being well cleaned before it enters the mold. The gate should be large enough so that the metal can flow freely and fill the entire casting and riser cavity with good fluid metal.

In many instances specifications require the attachment of a test bar to the casting. This is usually accomplished by having the gate that leads to the casting branch off into a smaller runner to the test bar. Then when the casting is shaken out of the sand, the runner is cut off just at a point where it will leave the casting and test bar attached so that the inspector may see that they were both poured from the same runner.

A good alloy to meet the requirements of the physical specifications demanded would be the 88 per cent copper, 8 per cent tin, and 4 per cent zinc, and even where a zinc is used that does carry a small impurity content of lead, this alloy will yield upwards of 50,000 pounds per square inch tensile and 25 to 28 and higher per cent elongation when cast properly. Castings from it are strong, but unless there is a little lead in it, they give some trouble in machining due to the toughness of the metal.

High Tensile Strength Needed For Long, Slender Casting

We are figuring on a job that requires a gray iron casting with a tensile strength of 45,000 to 50,000 pounds per square inch. The casting is 3 inches thick, 5 inches wide, and 87 inches long with a ½-inch web in the center. All surfaces are to be machined with the exception of the web. We melt our iron in a standard cupola in accordance with generally accepted practices, but find that our recent castings do not exceed 30,000 pounds per square inch tensile strength. Can you give us any information on an iron which will give satisfactory results?

The casting you mention is not going to be an easy piece to make. It is extremely long compared to its cross-section and is further complicated by the fact that two heavy members are joined by a relatively thin web. As might be expected, in determining a suitable analysis for the job, you will have to base it upon the heaviest section, and then endeavor to adjust the resulting structural formation to satisfy, if possible, the conditions engendered by the ½-inch web section. That of course can be accomplished through the addition of such alloying agents as nickel or molybdenum.

Therefore, suggested compositions for the casting include one containing 1.10 per cent silicon, 0.75 to 0.95 per cent manganese, 0.20 per cent phosphorus, and 1.75 per cent minimum nickel. The other suggested mixture contains 1.30 per cent silicon, 0.70 to 0.80 per cent manganese, 0.12 to 0.16 per cent phosphorus and 0.45 to 0.55 per cent molybdenum. In both compositions the total carbon should range from 2.90 per cent to 3.10 per cent, which means that the raw material charge should contain about 50 per cent steel scrap.

Trouble in Aluminum Castings May Arise from Two Causes

We are sending to you two samples of cast aluminum on which we would like your advice. The base material is cast scrap aluminum to which is added one-half of 1 per cent silicon alloyed with aluminum pig. We have used a cleaner, but it makes the castings too brittle so we have had to discontinue that, and are depending upon temperature. The metal is melted in cast iron pots.

Examination of the two small specimens of your cast aluminum show that both are as full of holes as the proverbial Swiss cheese. In our opinion these holes are caused essentially by gas absorption. Heating to a high temperature only aggravates the condition since the higher the temperature, the more gas is absorbed.

Some of the trouble undoubtedly is due to the use of nothing but miscellaneous cast scrap of unknown composition. You will be much better off to purchase secondary ingots of definite composition from a reputable smelter. Since melting all scrap usually results in a metal bath full of oxides, it is advisable to use some kind of a flux or cleaner to coalesce the finely divided particles into larger masses which will rise to the top of the bath where they may be skimmed off.

Most proprietary compounds for that purpose will work satisfactorily provided directions as to amounts and method of application are followed. They must be stirred in well, and then given sufficient time to separate from the metal and rise to the top. If you want to mix up a flux of your own you can try a mixture of 50 per cent cryolite, 35 per cent sodium chloride, and 15 per cent sodium carbonate. The material must be kept dry since application of a moist material to molten metal will cause an explosion.

One thing you will have to do is to reduce your melting and pouring temperatures and not leave the molten metal in the pot any longer than is necessary. Average pouring temperature of aluminum alloys ranges between 1200 and 1475 degrees Fahr. The higher temperature of course is for very thin sections. The melting temperature should only exceed the pouring temperature by an amount sufficient to permit fluxing, skimming and carrying to the mold side. About 50 or 75 degrees should be sufficient, but in any case it should not exceed 100 degrees Fahr. If you do not have a pyrometer for measuring temperature, it will be well worth your while to invest in such an instrument. Your cast iron melting pots should be cleaned carefully at the end of the day, removing all slags and other accretions sticking to the pot. Then a thin coating of a mixture of 50 per cent clay, 45 per cent water and 5 per cent water glass should be applied and allowed to dry thoroughly. That coating will protect the pot and diminish iron pick up. Proper and constant care of the cast iron pot in which the successive charges of aluminum are melted is essential to the production of clean metal and clean castings free from internal or external defects.

To Stop Leakage in Brass Castings

Do you know of any method of heat treating a machine finished bronze casting to prevent it from sweating under pressure. The castings are for high pressure pumps used in the oil industry and are tested with distillate at 500 pounds per square inch pressure.

Lack of information on the composition of the castings places us under a severe handicap. Some castings leak or sweat unless they receive the proper heat treatment. Other compositions equally capable of withstanding some pressure do not leak or sweat even without any heat treatment. Most high pressure bronze valves give no trouble by leakage or sweating and are regularly subjected to pressures in excess of 500 pounds per square inch. A typical composition where the wall thicknesses are properly designed, contains copper 90 per cent, tin 6½ per cent, lead 1½ per cent, zinc 2 per cent.

This composition known as valve or steam bronze sometimes contains a little more lead and proportionally less copper. In other instances the zinc content is a little lower, for example (a): Copper 89 per cent, tin 6½ per cent, lead 2½ per cent, zinc 2 per cent; or; (b) Copper 89 per cent, tin 6½ per cent, lead 1½ per cent, zinc 3 per cent. In other instances satisfactory castings have been made from the old standard alloy 88-10-2, copper 88 per cent, tin 10 per cent and zinc 2 per cent. This alloy during solidification develops a secondary crystalline phase known as the delta phase. Crystallizing out during cooling produces microscopical cavities or interstices which if they happen to line up with one another may provide a passage for fluids such as distillate under pressure with the resulting sweat.

This type of alloy is subject to correction by suitable heat treatment. The casting is raised to a temperature of 1200 degrees Fahr., held for an hour or in some instances 2 hours and then allowed to cool slowly. Usually furnace and castings are allowed to cool together over night. This is an expensive process and is not always completely successful since shrinkage cavities which may be present at the junction of light and heavy sections cannot be corrected by any heat treatment. Shrinkage of any metal cannot be cured by heat treatment. It must be prevented by proper feeding during the cooling period.

Makers of valve and pump body castings subjected to pressure favor the addition of lead to the composition. The fluid fills the interstices in the metal as the bronze cools from the liquid to the solid condition. It is quite common practice to tin the inside of high pressure valve and pump bodies. The fluid tin fills the pores and prevents leakage. A good tin wash on the inside of the casting definitely cures any trouble of this kind. Experience in tinning the castings may be developed rapidly. Application of the tin coating becomes a simple routine practice, relatively economical except for the cost of the high price metal. For tinning purposes a high tin solder usually is employed. The casting first is pickled to present a perfectly clean metal surface for adherence of the solder.

In some instances leaky castings are filled with silicate of soda (water glass) under pressure. Some of the material enters the pores and closes them. This is not always satisfactory since in service the material may be forced out with resultant leakage. Briefly, if the right composition is used, if the casting is properly molded, if every place that needs feeding is properly fed and if no dross inclusions are present, there should be no leakage in the casting. Necessary precautions must be taken to melt the metal properly so that sound metal is poured into the mold. Pressure of 500 pounds per square inch is not excessive. Many bronze castings subjected to pressures ranging from 1000 to 1200 pounds per square inch function satisfactorily even without tinning.

Requirement Covers Ounce Metal

We have some bronze castings to make and the alloy specified is type 1, composition 2, federal specification QQ-B-691A. Can you tell us what the composition should be?

The specification mentioned lists composition 2, type 1, as follows: Copper 84 to 86 per cent, tin 4 to 6 per cent, zinc 4 to 6 per cent, lead 4 to 6 per cent, iron, 0.25 per cent maximum, nickel. 1 00 per cent maximum, and phosphorus 0.05 per cent maximum. Physical requirements are a minimum tensile strength of 30,000 pounds per square inch, and an elongation of 20 per cent in two inches.

It will be noted that the specification covers the 85-5-5-5 alloy plus the addition of up to 1 per cent nickel. The nickel is not mandatory and frequently the composition is made without the nickel.

When the casting is subjected to hydrostatic pressure, addition of 0.5 per cent nickel may help to reduce rejection from leakage. Phosphorus must be at a minimum and the low iron content means that scrap cannot be employed.

Encounters Trouble With the Surface

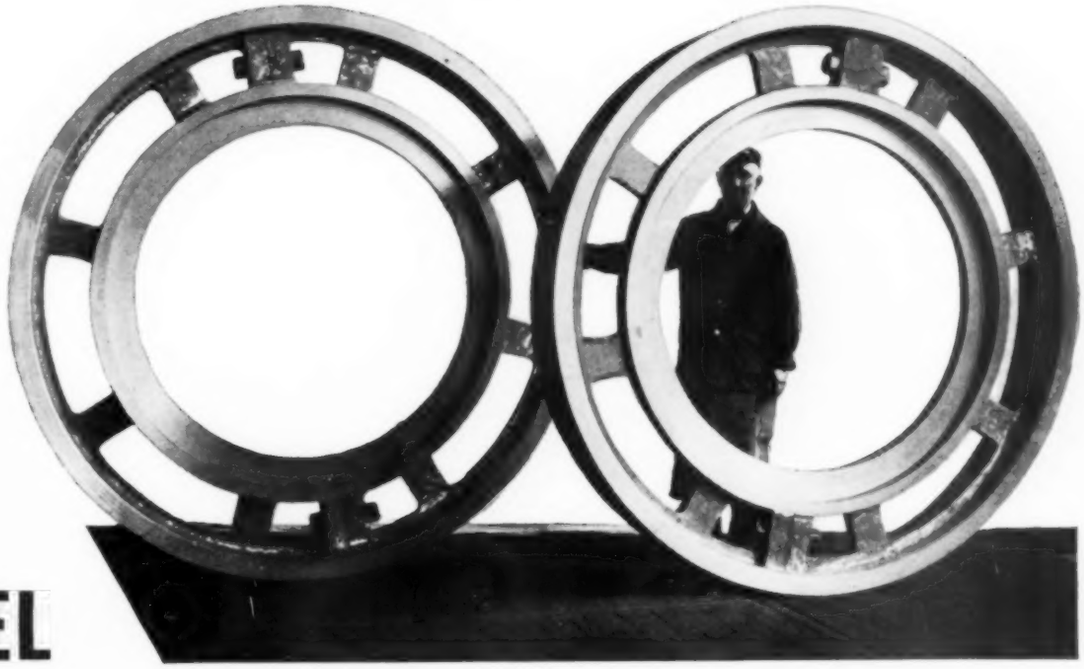
We make stoveplate castings which are streamlined and enameled. Some of them are difficult to run, especially those which are enameled. Our worst trouble is that the plain surface castings, *scar*, and the *scarred* part of the casting is always higher in combined carbon. We have tried different gating methods without improving the result. We believe that it is the fault of the mixture which shows 2.40 per cent silicon, 0.46 per cent manganese, 0.095 per cent sulphur, total carbon 3.29 per cent, and the combined carbon runs between 0.59 to 0.65 per cent. We are using 20 per cent auto cylinder blocks, and we would like to increase the silicon, phosphorus, graphitic carbon, and fluidity. We are submitting two mixtures for your comment.

Your reference to the terms *scar* and *scarred* is new to us, but it occurred that you probably refer to a portion of the casting surface which is smooth or slick, and shiny as opposed to the regular gray appearance. We have observed such spots on cast iron radiator sections, and found invariably that they resulted from the molder *striking* the pattern when peining. That is to say the pein struck the thin layer of sand over the pattern, and caused it to become quite dense. Occasionally such spots resulted from pieces of tramp iron close to the mold surface, and from sand on the wet side.

You do not mention anything about your cupola practice, and we wonder if some of your trouble might not be due to not melting your iron as hot as you can get it. It is suggested that you investigate that problem and make any necessary changes to insure hot iron. While, as you mention, automobile cylinder blocks may contain chromium, molybdenum and nickel, we believe that remelting will leave only a small amount of chromium and molybdenum in the final metal since those elements are oxidized easily.

We believe that the No. 1 mixture you mention using 400 pounds of pig iron containing 3.72 per cent silicon, 200 pounds of cylinder blocks, 200 pounds of agricultural machinery scrap, and 200 pounds of returns probably will give you better results than No. 2 employing 200 pounds of pig iron containing 5.50 per cent silicon, 300 pounds of cylinder blocks, 300 pounds of agricultural machinery scrap, and 200 pounds of returns. Of course the only method of knowing definitely is to try them out. However, in both cases we believe that it will be advisable to add some ferromanganese to the charge to bring the manganese content in the final iron up to 0.60 per cent.

Do you get "COLD CHILLS" when casting BIG GEAR BLANKS?



You'll take pride in perfect castings like these 8' gear blanks, produced by Bagley and Sewall from even textured Nickel iron. These gears are also produced of Nickel-chromium alloyed cast iron.

...NOT WHEN YOU USE

NICKEL

These gears were made by Bagley and Sewall Co., Watertown, N. Y. of an alloy cast iron containing 1.50% Nickel and 0.75% chromium. They are used to drive pebble mills.

WHEN casting gear blanks, large or small, the use of a nominal amount of Nickel is the cheapest insurance against producing an unsatisfactory gear.

The ability of Nickel to eliminate chilled corners and edges and equalize the structure in widely different sections is well established. This important contribution is reflected in more satisfactory machinability and lower tool costs by your customer.

Density at the roots of cut teeth is assured in a properly balanced Nickel alloyed cast iron, thus avoiding the possibility of expending foundry and machining time on a gear which finally must be rejected.

Your customer's good will is important. You can retain it through the simple and inexpensive use of Nickel.

Assistance in solving your foundry problems on gears and other castings will be freely rendered if you will communicate with the address below.

NICKEL CAST IRONS

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL ST., NEW YORK, N. Y.

Pinholes Appear in Aluminum Alloy

We are enclosing a specimen cut from an aluminum alloy casting, which is typical of all that we have made, in that many fine pin holes show up after machining. The raw material used is cast cylinder heads, pistons, and other scrap castings. It is melted in an iron pot, not covered, and the furnace is gas fired; the gas under natural pressure and the air supplied by a blower. Castings are made in green sand, and the pin holes show up regardless of the size of the casting.

We believe your difficulty is the result of the molten metal absorbing gases during melting. Consequently, you will have to use more care in melting to see that the gases of combustion are kept away from the molten metal as much as possible. Possibly part of the difficulty may be due to the fact that you are having incomplete combustion, and hence reducing gases which are more easily absorbed by the molten aluminum. It may be that you are melting the metal at too high a temperature and that is bad practice. The higher the temperature, the more gas that will be absorbed. The metal should be melted at as low a temperature as possible allowing only sufficient difference between that and the pouring temperature to permit skimming, and carrying the metal to the mold side. In pouring the metal, keep the lip of the pouring ladle as close to the sprue opening as possible to avoid inspiration of air into the molten metal stream.

Polished Rolls Are Cast Vertically

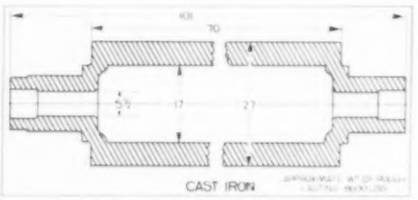
We are considering making some cast iron rolls shown on the accompanying sketch. The castings are to be finished all over and must be perfectly clean. We shall appreciate your opinion on the best way to mold and gate these castings.

Since the surface of the roll is to be polished all over, you cannot use chaplets on the core. Therefore the mold must be cast in a vertical position. The practically universal custom is to gate these castings on the top. A ring of small pop gates conducts the iron from a circular pouring basin. The upper neck of the roll may be carried up an extra 8 or 10 inches and is filled with metal after the pop gates have frozen. An extra $\frac{3}{4}$ or 1-inch of metal is added to the top shoulder of the roll for machining. The mold of course is dried and blackwashed in the usual manner.

If you have any doubt of the sand on the bottom of the mold resisting the falling iron, you could run a long sprue to the bottom and pour enough iron in there to fill the bottom neck and a few inches of the body before pouring the bulk of the iron through the pop gates on top. The first iron will form a cushion.

Your pattern equipment and available flasks will determine the manner of making the mold. The mold may be made horizontally in two half flasks with a sweep attached to a spindle and held in place by suitable bearings attached to the open ends of the flask.

A complete pattern split in halves may be utilized to make the mold horizontally with the sand rammed either by hand or on a bumper. If a bumper is available, one half pattern will serve for both halves of the mold, since the casting is symmetrical. After the mold is blacked and dried it is assembled and turned up on end for pouring.



Whether the mold is made in a horizontal or vertical position it is poured in a vertical position

The mold may be made from a circular pattern in a stack of round flasks. The pattern consists of the neck and approximately 12 inches of the body. A suitable number of flask rings are placed around this part pattern, rammed up and rolled over in the usual manner. Then other ring flasks are added and the pattern is drawn up until the required height is reached. The pattern then is withdrawn and a separate ring flask is rammed up to contain the upper neck. The core is held with some type of steady rest at the top and anchored by a hook bolt in the bottom.

Slag Cause of the Defect in Bore

We are forwarding parts of three malleable iron castings perfect in every respect with the exception of one or two small holes near the center of the bore. We shall appreciate your opinion on the cause of this defect.

If you examine the holes under a fairly strong magnifying glass you will find sufficient traces of slag to indicate the cause of the trouble. A few bubbles of gas encased in slag envelopes floated in with the metal. In the mold they rose to a point where they touched the cold core and immediately became anchored. Obviously the remedy is to check up on the gating and pouring technique and adopt suitable precautions to prevent the entrance of any slag with the metal.

Defect in Casting Looks Like Blow

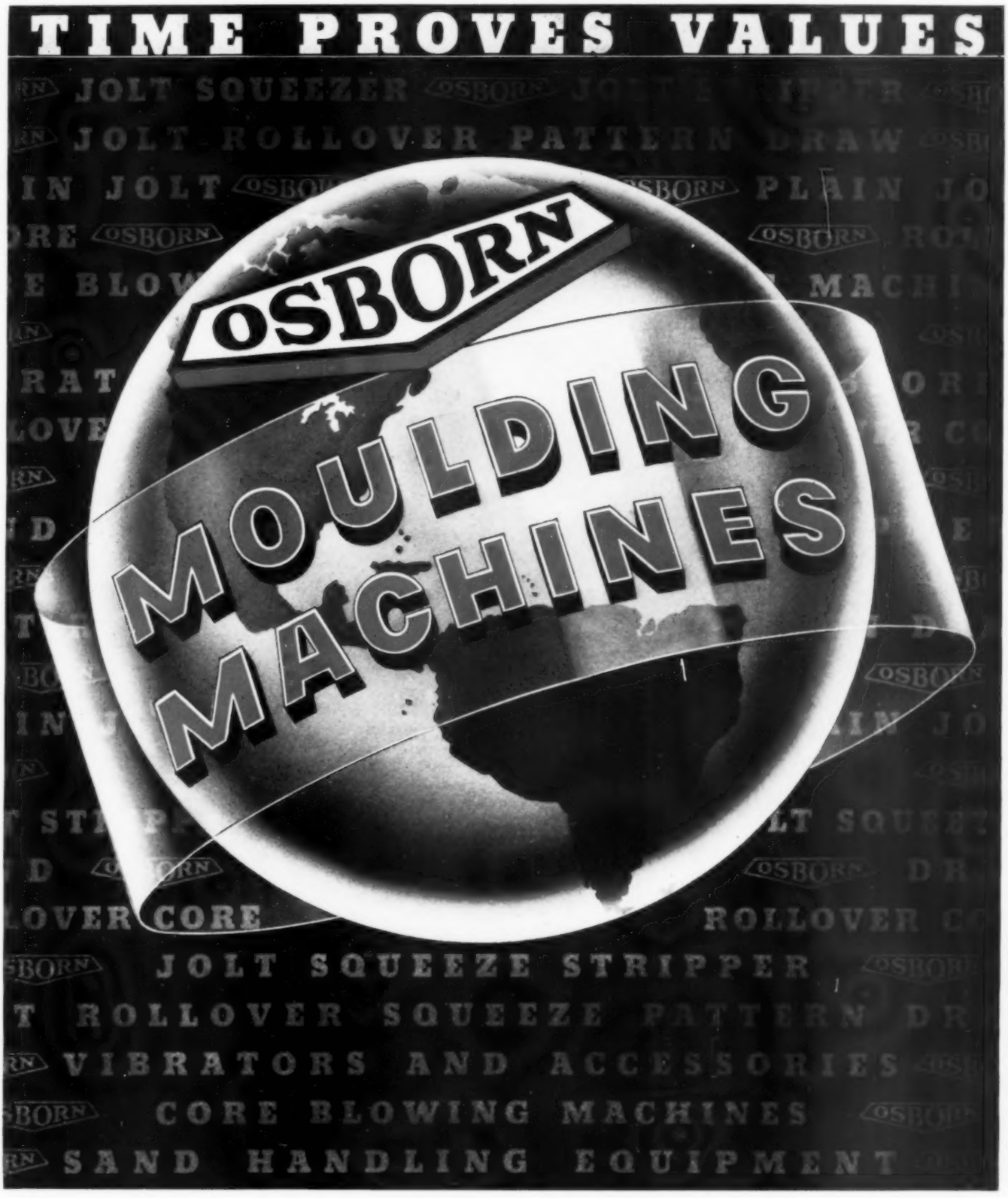
We are sending a brass casting which shows a segregation directly in front of the gate. The castings were made two in a flask, gated through a 2-inch feeder, and poured through a 1-inch sprue. The metal was poured at 2100 degrees Fahr.

Examination of the casting leads us to the opinion that the defect you mentioned evidently is a blow probably from the core. Obviously, the correction lies in proper venting of the cores, and use of cores in which the bonding material is at a minimum. Appearance of the metal indicates good melting practice since the casting is sound except where the blow has occurred.

If you have to make a large number of the castings, you probably will find it advantageous to make half patterns, and cast them half in the cope and half in the drag with the core running horizontally through a series of cavities. All patterns would be on edge permitting a large number of castings in a mold and the flow of metal would be around the core in such a way that gas would be developed on all sides almost simultaneously. If the cores were open so that gases could pass freely through a center vent later on, no trouble would be experienced.

Another method of casting would be to invert the casting or pattern just opposite to your present method. That would mean hanging cores in the cope, but with a reasonably long print, no difficulty should be encountered. The casting looks as though it is not cored clear through and it is the blind end that is blowing and agitating the metal to form the drossy formation. However, if the cores go all the way through, it would not be necessary to hang the core in the cope.

Since you do not give the composition of the metal, we cannot be positive about the correct pouring temperature. However, we believe that you can use a lower temperature than 2100 degrees Fahr. If so, burning of the core will not be so pronounced and a higher percentage of good castings will be obtained since less gas will be developed.



● 1940 is here—bringing with it a renewed challenge. Have you prepared to meet the New Year's demands at lowest obtainable costs? ● Improvements and developments in Osborn Moulding and Core Blowing Machines have kept pace with the requirements of the Foundry Industry.

● Many foundries have already taken advantage of these latest production facilities and their adoption by you may have an important bearing on your profit or loss in 1940. ● If you will name the time and place, our Engineers will welcome the opportunity to help you insure best operating results.

THE OSBORN MANUFACTURING COMPANY • 5401 HAMILTON AVENUE • CLEVELAND, OHIO, U. S. A.

MEN of INDUSTRY

A. J. EDGAR, formerly foundry superintendent, Fuller Mfg. Co., Kalamazoo, Mich., has been appointed foundry superintendent, General Railway Signal Co., Rochester, N. Y. Mr. Edgar was born in Crosswell, Mich., Dec. 17, 1909 and attended Michigan state college where he received his bachelor science degree in mechanical engineering in 1932. He then worked for the Saginaw Malleable Iron Co. for 4 years, and in 1936 became affiliated with the Steel Sales Corp., Chicago, a distributor for the International Nickel Co., in which he served as foundry engineer in the development of alloy cast iron. Following that, he became superintendent of the Fuller Mfg. Co. Mr. Edgar is a member of the American Foundrymen's association.

♦ ♦ ♦

ARTHUR W. ALLEN and DIKRAN KAZANJIAN recently have organized the Lincoln Iron Foundry, 1000 Twenty-fifth street, San Francisco. Mr. Allen, who has been connected with the foundry industry for 33 years, was born in London, England, and came to the United States in 1888. He served his apprenticeship at the Union Iron Works, Spokane, Wash., under the supervision of Bert Smith, well known foundryman of the Pacific coast, and then worked as a molder in many parts of the country. Following the World war he became connected with the San Francisco Stove Works, and was general manager when he resigned. Mr. Kazanjian is well known for his part in the building of the famous British Market and Race Track in Tien Tien, China. He is a native of New York.

♦ ♦ ♦

G. C. COLE recently has been appointed assistant to the general manager of the National Motor Castings division, Campbell, Wyant & Cannon Foundry Co., South Haven, Mich. Mr. Cole was born in Kankakee, Ill., and was educated in the public schools of that city. His first position was with Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., as an apprentice molder, and was one of the first men employed by that company. At the outbreak of the World war, Mr. Cole crossed the border and enlisted in the Canadian army, and later received a commission in the Royal air force. He did not return from France until June, 1919. Following the war he became connected with Allith-Prouty Co., Danville, Ill., as foundry foreman, advancing to the position of foundry superintendent during the 10-year period he was with the company. From 1928 to 1931 Mr. Cole was general foundry superintendent for the R. Herschell Mfg. Co., Peoria, Ill. In 1932 he became foundry foreman of the Caterpillar Tractor Co., Peoria, and in 1933 he joined the Argos Foundry Co., Plymouth, Ind., as general superintendent. For the past 5 years Mr. Cole has been general molding foreman, Peoria Malleable Castings Co., Peoria.

♦ ♦ ♦

J. R. SCHOLES recently was made assistant to John Weidephul, superintendent, Wehr Steel Co., Milwaukee. Mr. Scholes was born in Hamilton, Scotland, and served his apprenticeship as a molder with A. Baird & Sons, steel founders, Hamilton. He then worked several years in the Glasgow district and enlisted in the Lovat scouts in 1915. After 2 years as a motor dispatch rider he was commissioned as an officer and

(*Continued on page* 44)

A. J. Edgar

J. R. Scholes

G. C. Cole

A. W. Allen

LENGTHENING THE LIFE OF EXPENDIBLE PARTS

The replacement of expendible parts has a persistent way of blocking the path to mine operating economy. By the same token, it offers a great opportunity for cost reductions.

For example: a mine was having plenty of trouble with conveyor screws for handling cinnabar. Requisitions for replacements were coming along all too frequently.

Chromium-Molybdenum cast steel screws solved that problem. A simple preliminary heat treatment gives the screws strength and toughness to withstand heavy pressure and impact loads. Flame hardening the flights to 630 BHN gives them the ability to stand up for long periods under the severely abrasive action of the ore.

The records show that the Chrome-Moly screws last three times as long as others previously used which were actually higher in cost.

Rechecking your own parts specifications may disclose opportunities for similar savings. Our technical book, "Molybdenum in Steel", is sent free on request to interested production executives and engineers.

PRODUCERS OF MOLYBDENUM BRIQUETTES, FERRO-MOLYBDENUM, AND CALCIUM MOLYBDATE

Climax Mo-lyb-den-um Company
500 Fifth Avenue · New York City

MOLY

(*Continued from page* 42)

served with the fifth regiment, Royal Scotch Fusiliers. Mr. Scholes came to the United States in 1920. He first was connected with the American Steel Foundries, East Chicago, Ind., as molding inspector, and with the Nugent Steel Castings Co., Chicago, as foreman. He also was with the National Malleable Steel Castings Co., Chicago, for 8 years as assistant superintendent in the steel foundry, before going to Milwaukee.

♦ ♦ ♦

GILMORE J. LANDSTROM, manager of the foundry division, Sundstrand Machine Tool Co., Rockford, Ill., is the chairman of the Northern Illinois-Southern Wisconsin Chapter of A. F. A. Mr. Landstrom was born in Rockford, graduated from Rockford high school and been connected only with Rockford concerns. From 1917 to 1929 he was secretary of the Rockford Union Foundry, and since that time has been manager of the foundry division of the Sundstrand company. Mr. Landstrom also is secretary of the Rockford Machine Tool Co., but is not active in that concern.

♦ ♦ ♦

WARDEN F. WILSON, formerly Pittsburgh district manager, American Steel Foundries, has been appointed general sales manager, Lebanon Steel Foundry, Lebanon, Pa. Mr. Wilson has been identified with the steel casting industry since his graduation from the University of Illinois in 1925, when he joined American Steel Foundries as a special apprentice at its Indiana Harbor, Ind. works. In 1928 he was appointed night superintendent, and a year later, advanced to assistant to the works manager, holding that position until his promotion and transfer to Pittsburgh as manager of Pittsburgh works. A thesis on the "Welding of Cast Steel" won him a degree of professional mechanical engineer from the University of Illinois in 1937. He is a member of the American Society of Mechanical Engineers, the Engineers Society of Western Pennsylvania, the American Foundrymen's association, the Railway Club of Pittsburgh, and the University Club of Pittsburgh.

♦ ♦ ♦

HENRY D. PHILLIPS, formerly of the Dodge Steel Co., Philadelphia, has been made product engineer of the Lebanon Steel Foundry, Lebanon, Pa. Mr. Phillips has been associated with the steel casting industry since leaving the University of Pennsylvania in 1928, having been identified with Stockham Pipe Fitting Co., Birmingham, Ala., as steel foundry superintendent and later with the Dodge Steel Co. as chief metallurgist and general superintendent. He is a member of the American Institute of Mining and Metallurgical Engineers, the American Foundrymen's association, the American Society for Metals, and the British Iron and Steel institute.

♦ ♦ ♦

I. R. WAGNER, Electric Steel Castings Co., Speedway, Indianapolis, recently was elected chairman of the newly formed Central Indiana chapter of the A. F. A. Mr. Wagner was born in Reading, Pa., in 1894, and was graduated from high school in Shamokin, Pa., in 1912. He then entered the employ of the Alan Wood Iron & Steel Co., Ivy Rock, Pa., as a helper in the maintenance department, and after a short period, transferred to the chemical laboratory as a test boy. After serving in various capacities in the then developing metallurgical department, he transferred in 1915 to the Midvale Steel Co., Philadelphia, as an analytical chemist and later became chief chemist of the Midvale works, Wilmington, Del. In 1918, he became identified with the inspection division of the ordnance department, establishing checking laboratories at various steel plants, and in 1919 transferred to the arsenal at Watertown, Mass., as a metallurgical chemist. In 1920 he became metallurgist and chief inspector of the Electric Steel Castings Co., Indianapolis, and 2 years later was made superintendent over all plant operations. In 1934, he was made vice president and general manager of the firm succeeding the late M. G. Spencer.

♦ ♦ ♦

HENRY R. FOX, Chicago, recently was appointed general field engineer, Despatch Oven Co., Minneapolis.

♦ ♦ ♦

A. H. LAUER recently was made assistant works manager, and J. MORRISON, works engineer of the American Steel Foundries, Granite City, Ill.

♦ ♦ ♦

DOUGLAS F. G. ELIOT, general commercial manager, Western Electric Co., New York, for the past 3 years, has been appointed general purchasing agent.

♦ ♦ ♦

W. L. MCGRATH, vice president, Williamson Heater Co., Cincinnati, has been made president of the Industrial Association of Cincinnati, to succeed GEORGE A. SEYLER, works manager, Lunkenheimer Co., Cincinnati.

♦ ♦ ♦

WILLIAM J. HUTCHINSON has been elected treasurer and director and HENRY S. WINGATE has been named secretary of the International Nickel Co. of Canada Ltd., to succeed JAMES L. ASHLEY, secretary-treasurer, who retired recently.

♦ ♦ ♦

ROBERT R. ADAMS, a graduate in chemical engineering of Antioch college, recently has joined the technical staff of Battelle Memorial institute, to do research in process metallurgy. He is a member of the American Society for Metals.

♦ ♦ ♦

RALPH M. HOFFMAN, vice president and sales manager, Link-Belt Co.,

(*Concluded on page* 46)

G. J. Landstrom

W. F. Wilson

I. R. Wagner

H. D. Phillips

Steel Foundry Makes 4 Separate Savings With Low-Cost Truline Binder

Typical of the savings of many foundries is the experience of one modern steel foundry located in the Middle West. This foundry has practically standarized on Truline Binder for all operations and reports direct savings in four ways.

1. Uses 70% Reclaimed Sand

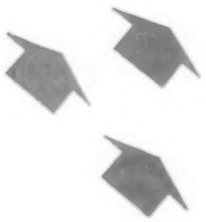
Where their old mix called for 100% new sand, this foundry now uses but 30% new sand and 70% reclaimed sand. Truline Binder makes this worth-while saving possible, yet produces superior cores.

2. Saves On Binder Costs

Using low-cost Truline Binder to replace the more expensive binder previously in use, this foundry saves another sizable amount, with more uniform core properties as an additional advantage.

3. Bakes In Half The Time

Truline Binder, carefully manufactured for its one use, saves this foundry money in yet another way — by reducing drying time to a uniform two hours, instead of the three-and-one-half to six-hour drying time formerly required. The baked cores are strong and permeable, will not sag.



4. Reduces Cracked Castings

This most important saving is one that must be experienced to be appreciated. It is particularly important when dealing with high-shrinkage castings. Truline Binder has the property of burning out completely after the metal is poured, allowing the core to collapse as the metal shrinks. Thus Truline is a material aid in producing strong, smooth castings.

★ ★ ★ ★

Truline is equally good in steel, gray iron, and malleable iron casting, especially where high shrinkage or intricate detail is a factor. Profit by the experience of others, and write for a trial lot today. Use the handy coupon below.

TRULINE* BINDER

*Reg. U. S. Pat. Off. by Hercules Powder Company

Can Be Used Wherever Metals Are Cast

BRANCH OFFICES

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HERCULES NAVAL STORES

HERCULES POWDER COMPANY *Incorporated* 999 Market Street, Wilmington, Delaware

☐ Please send further information and prices on Truline Binder.

☐ Please send samples for test.

Name _____

Position _____

Company _____

Address _____ JJ-26

ADVERTISING PAGES REMOVED

(*Concluded from page 44*)

Pacific division, San Francisco, recently was appointed assistant to the president of the parent company, Link-Belt Co., with headquarters in Chicago.

• • •

T. M. FOLEY recently retired as superintendent of the Tacoma, Wash., plant of the Griffin Wheel Co., and has been succeeded by J. W. JACKSON, formerly plant superintendent, Cleveland Production Co., Cleveland, a subsidiary of the Griffin Wheel Co. ED. M. FOLLMAN, formerly of the Chicago plant, has succeeded Mr. Jackson in Cleveland.

Mr. Foley became connected with the Griffin Wheel Co., Nov. 18, 1905, as general inspector. He held various positions, including local inspector, charging room foreman, and assistant superintendent, and received his first appointment as superintendent of the old stock yards plant, Chicago, in 1909. A year later he was transferred to the St. Paul plant as superintendent and in 1911 was appointed superintendent of the Tacoma plant. He remained there until February, 1923, when he was appointed superintendent of the Sacramento square plant in Chicago. In September of that year he was appointed traveling superintendent in charge of manufacturing operations for all plants, and in 1925 was appointed superintendent of the foundry division for all plants with headquarters in Chicago. In 1930 he returned to the Tacoma plant as superintendent.

Mr. Follman, who has been made plant superintendent of the Cleveland Production Co., has been connected with the Griffin Wheel Co. since 1915. He started work in the office of the Pullman plant, and then was transferred to the general office where he spent 8 years in the cupola department. Since then he has alternated as assistant to the superintendent at the Chicago and the Pullman works. For the past 3 years he has been assistant to the superintendent at Chicago.

Mr. Jackson became connected with the Griffin Wheel Co. as assistant charging room foreman at the old stock yards plant, Chicago, Sept. 21, 1912. When that plant was dismantled he was transferred to the Sacramento square plant, Chicago, as charging room foreman, and continued in that capacity until 1920 when he was made assistant superintendent of the Denver plant. In 1924 he was transferred to Kansas City in the same capacity and then was made superintendent at Tacoma in 1925. He remained there until Nov. 1, 1930, when he was placed in charge of the Cleveland Production Co., Cleveland.

• • •

F. J. WURSCHER recently has become associated with the Acme Steel & Malleable Iron Works, Buffalo, in a metallurgical capacity. Mr. Wurscher formerly was with Stanley G. Flagg & Co. Inc., Philadelphia.

• • •

FRANK F. BONNEVIER, formerly with Allegheny Ludlum Steel Corp., and Buffalo Stainless Steel Foundry, has joined the supervisory staff of Cooper Alloy Foundry Co., Elizabeth, N. J. C. T. COFFMAN, formerly with Packard Motor Car Co., Detroit, also has joined the Cooper company.

• • •

T. FRED BAILEY has been made secretary and treasurer, Davenport Machine & Foundry Co., Davenport, Iowa, succeeding M. N. FORKNER, resigned. Mr. Bailey formerly was comptroller of the Oliver Farm Equipment Co., Chicago.

• • •

WALTER E. NAYLOR, formerly with the Beardsley & Piper Co., Chicago, recently has become connected with the Velsicol Corp., Chicago. As foundry engineer of the latter company, Mr. Naylor will act in a technical and sales capacity in connection with the sale of core oil. Mr. Naylor also spent 12 years as master mechanic of the St. Paul division, International Harvester Co.

• • •

JEROME STRAUSS, vice president in charge of research and development, Vanadium Corp. of America, recently moved from the laboratories in Bridgeville, Pa., to the general executives offices of the company, 420 Lexington avenue, New York.

• • •

FRANK P. NORRIS, vice president and manager, Phoenix Iron Co., Phoenixville, Pa., retired Jan. 1, after 50 years' continuous service. Mr. Norris will continue for a time in a consulting capacity. MALCOLM FARMER will succeed Mr. Norris and will serve as executive vice president. Mr. Farmer formerly was superintendent of the company's rolling mills, later executive vice president of the Stanley Works, New Britain, Conn.

• • •

J. V. PUCCINI, general manager of production, Richardson & Boynton Co., with plants in Dover, N. J., Buffalo, and Whitesboro, N. Y., recently has moved his headquarters and residence from Dover to Whitesboro. Mr. Puccini first became connected with the foundry industry in 1912 when he was hired by the former Monitor Stove & Range Co., Cincinnati, to learn the various phases of the business. After being trained over a period of years in other departments, he was placed in the foundry, later was made foreman, then assistant superintendent, and finally in 1918 superintendent. In 1923 he became connected with the Richardson & Boynton Co. as assistant superintendent, and later became superintendent of the Dover plant. He held that position until 1936 when he was made general manager of production.

J. W. Jackson

T. M. Foley

E. M. Follman

FOUNDRY DEVELOPMENTS AT SHORT RANGE

RECENT development in heat treating or hardening of interior surface of cylinders, tubes, bores, etc. is the use of induction heating followed by a water quench. It is claimed that interior diameters from 2 inches up, and up to 50 feet in length may be heat treated by the process. Depth of hardening can be controlled accurately, and may be varied from 0.03 to 0.125-inch. Area and degree of hardness also can be maintained within close limits. It is said that due to the high speed of heating and application of heat only to the area and depth to be hardened, distortion is held to a minimum.

* * *

A yellow brass which has gained popularity for chandelier or lamp work contains about 70 per cent copper and 30 per cent zinc. It has high fluidity, enabling pouring into thin sections easily, and possesses high ductility so that pieces can be poured flat and when cold, formed into curves and other shapes without cracking. It has a fine cast color and will take an acid dip.

* * *

After 3 years of progressive effort, a new system of sand conveying and mold making has been developed in a British foundry. In this new system the molding sand is blown through a small pipe with compressed air. Foundrymen in various countries are familiar with several attempts in recent years to handle sand in this manner. Compressed air has been used for many years to blow sand into coreboxes, but—as every investigator up to the present has found out—core sand and clay bonded molding sand do not react in a similar manner. The British installation apparently has solved the problem. An air belt above the base of an inverted cone distributes the air through the sand. The compressed air serves the triple purpose of agitating and aerating the sand and propelling it under pressure into the distributing line. Air pressure can be regulated to meet molding requirements. An agitator revolving in the bottom of the cone keeps the sand properly mixed with air and carried away through an 1½-inch steel pipe to the molding station. Up to the present it has been found that approximately 60 feet is the workable limit. At the molding station the delivery nozzle is manipulated to fill the flask with sand at any desired density.

* * *

DISSOLVED gases in brass and bronze may be removed by addition of around 0.2 per cent red cuprous oxide or nickel oxide shortly before pouring. The oxides must be perfectly dry and stirred in well. Before the metal is poured into the molds it should be deoxidized in the usual manner with phosphor-copper.

* * *

A new preparation combines a high quality soft solder and a flux. It is a thick, pasty material, and is said to eliminate use of soldering irons, other fluxes and special equipment. The material is brushed on the work and heat supplied by a blowtorch, gas flame, spirit lamp, etc. It is claimed that through use of the paste solder waste is eliminated, time and labor are saved, and good unions are made regardless of surface, size, shape or conditions.

* * *

Clay pellets or particles resulting from improper sand conditioning tend to pick up a coating of fines, and cause trouble in obtaining a satisfactory, smooth casting surface. That is because the fines absorb an excess of water, and when the molten metal comes in contact the steam formed may create pinholes, a generally pitted surface, and at times so-called worm holes of various depths that may be at right angles or inclined to the surface with straight or wavy paths. One prevention is to see that the molder discards the tailings left on the riddle.

* * *

DUST and dirt allowed to accumulate on reflecting surfaces of lighting equipment for one month after installation may decrease the light output from 15 to 25 per cent. Absorption of light by dust or dirt on reflectors and wall surfaces in many cases will cause a good system to render insufficient illumination for the kind of work performed. Hence reflectors and bulbs should be wiped with a clean, dry cloth every two weeks, and washed with warm water and soap every 4 to 5 weeks.

* * *

Spot test for detection of nickel in aluminum alloys is to apply 1 drop of a 20 per cent caustic soda solution to the surface of the specimen and allow the reaction to proceed for 1 to 2 minutes. Then add 2 drops of 1:1 nitric acid, mix well with a glass rod, and add 2 drops of dimethylyglyoxime solution. A rose colored precipitate indicates the presence of nickel.

* * *

Welding of thin-gage nonferrous and ferrous materials such as aluminum, copper-base alloys, nickel silver, zinc, low and high carbon steels, and stainless steels is said to be accomplished successfully with a newly developed paste and rod used at a temperature of 450 degrees Fahr. Numerous advantages are claimed for the process.

* * *

It is said that a simple test to determine whether or not an oil or gas fired furnace is being supplied with an oxidizing flame is to pass a piece of cold zinc through the flame. If carbon is deposited on the zinc, the flame is reducing, and if the zinc remains clean the flame is oxidizing.

THE ADVENTURES OF BILL

By PAT DWYER

Drawings By RICHEY

EVERY once in a while," said Bill, the other night, "I get a letter from an old friend of mine on the west coast or to be a trifle more specific in the city of Portland in the well known Irish state O'Regon. Out there they pronounce it Or-e-gon, but then there is no accounting for tastes. The city is on the river Willamette about 12 miles from the junction with the mighty Columbia. Any ordinary person seeing the name in print would pronounce the word Willamet. To go slightly poetical on the thing if you said Willa-met, you would be all wet. For some reason which I never have been able to ferret out the people out there say Will-AM-et. The government program of building great dams all over the country in recent years may have had something to do with placing the accent on the AM, but I wouldn't know about that."

"Lesson in geography duly received and contents carefully noted," I said, "so what? Who is this citizen who dips his trusty pen in the ink pot every now and again. What does he do? What do you know about him? What does he write about?"

"You remind me of an old foundry carpenter in the shop where I served my time. He was a crabby old bird with a skilled craftsman's pride in keeping his tools in perfect condition. Occasionally I borrowed an axe or a saw to trim the bars in a flask. Any person who ever attempted one of these jobs knows that an old flask bar contains enough nails, visible and invisible, to sink it if thrown into the water. When I brought the tools back with a few nicks in the edge of the axe and with the points of the saw teeth —ah—slightly blurred, he would snap them from me and spray me with cruel words, a kind of a mixture of David's lament over Absalom and the witches' chorus while dancing around the pot in MacBeth. Normally he was not a bad old stick. One of his favorite remarks when referring to some incident or person was 'I won't mention no names, but the first two initials are John Jones.'

"The first two initials of my western correspondent are Len Schadd. He wrote me once before about a bunch of eels that choked the intake pipe of a shop run by water power and shut off the blast. Another time he told me about a lead casting that ran down a rat hole. This time he refers to the practice of a Pacific coast shop in quenching manganese steel castings. Part of the shop projects over the water. After the castings are shaken out they are dipped in this natural salt water bath. Purty clever, hey? I think the story is worthy of inclusion in the—as yet—unwritten collection of foundry lore, tradition and legend.

"Some of these stories deal with definite individuals, roving birds of passage, here today and gone tomorrow, without care or responsibility either for themselves or others. Rugged individualists in the truest sense of the word. They had neither morals nor conscience and as for tomorrow, well tomorrow could jolly well take care of itself so far as they were concerned. They worked when they felt like working. When they did not feel like working, all the king's horses and all the king's men could not drag them into a foundry. To be strictly accurate, I never heard of a case where the royal assistance was invoked, but on more than one occasion I have seen a delegation of one sober citizen sent to interview the delinquent member with a view of bringing him into the fold during rush periods.

Some people are easily peeved

"Invariably 'twas a case of love's labor lost. In certain instances the bearer of good tidings was treated —as they say in the Good Book— contume—something or other. I have heard the word often enough, but up to the present I never have occasion to use it. Probably in your browsing through the dictionary now and again you may have come across it and know the one I mean."

"An old friend of mine," I said. "I can't spell the word without looking it up, and I can't pronounce it spontaneously. I have to kind of sneak up on it and then take a long breath. Contumeliously, there it is, meaning rudeness compounded of haughtiness and contempt, scornful insolence, disrespectful treatment, disdain, contemptuousness in act or speech. I believe Matthew, XXII, 2-7, rings in the word in the sketch of the king who sent his servants out to invite guests to his marriage feast. It sems superfluous to point out that the telephone and postal service were not in use at the period. For various reasons the prospective guests turned up their noses and turned down the invitations. One ferocious lad treated the servants contumeliously and put them to death. Off hand I should say that was going a bit too far—"

"Never mind the remainder of the lecture. The lad gave the servants the works and that is precisely what happened to the bimbos I am talking about. In a few scattered instances the party of the first part did not abuse the party of the second part. On the contrary by offering bribes, cajolery and other valuable considerations in the form

(*Continued on page* 52)

HAPPY NEW YEAR FOUNDRYMEN . . .

To foundrymen of all countries, we extend sincere greetings of the season and best wishes for a New Year of increased production and profit. If we may be of service to you in any way, that will be a pleasure, too!

FEDERAL (TWISTED STEM) CHAPLETS

The Twist Does the Trick!

You, too, may find it worthwhile to try these famous chaplets in 1940. Twisting, among other advantages, produces knife-like fusion edges running the entire length of the stem. The heads are electrically welded and produce a one-piece, leakproof chaplet of excellent quality.

CHARLEROI SEACOAL FACING

Pulverized in modern, frictionless grinders which preserve the high, natural, volatile carbon in the coal itself, Charleroi Seacoal is scientifically screened and graded in 7 sizes to meet all foundry needs. Widely used and outstanding because of its perfect uniformity, Charleroi often effects savings in facings costs of 20% and higher. We will be glad to send you descriptive literature and samples.

FEDERAL GREEN BOND

Permeability and green bond strength may be controlled at will with Federal Green Bond (Wyoming bentonite.) It is the only bonding clay which develops the proper amount of dry strength to prevent cuts, washes, and other defects . . . and after 13 years' world-wide use, it is still a favorite bonding clay of foundrymen. By test, it shows 25 percent greater durability. Fully licensed for foundry use under U. S. Pat. Nos. 1657573, 1509406, 1509478 and Canada Pat. Nos. 249251, 249252.

LOWE HIGH-SPEED RIDDLE

Light in weight, the improved Lowe Electric Sifter is one of the fastest foundry sifters available. Will handle efficiently 4½ tons of facing sand or 6 tons of oil-based core sand hourly. Its reasonable cost will surprise you. Fully guaranteed. We will gladly sell you one or more of these fine units on a trial basis.

The FEDERAL FOUNDRY SUPPLY COMPANY

4600 East 71st Street • Cleveland, Ohio

CHICAGO CHARLEROI, PA. DETROIT MILWAUKEE MINNEAPOLIS NEW YORK ST. LOUIS RICHMOND, VA. UPTON, WYO.

(*Continued from page* 50)

of strong drink, he persuaded the party of the second part to share his freedom for the day. The shop had to get along with two empty floors instead of one. Other workmen in the shop invariably regarded one of these exploits with rude jest and hilarity. Later the story was told with embellishments and the generally conceded opinion that the boy was quite a card.

"Highly seasoned bits of spirited and less courteous repartee during the tense moments when the foreman and the molder break off diplomatic relations and definitely part company form part of the warp and woof in the legends and traditions of every foundry. Small incidents and brief remarks in the course of time become magnified into truly major battles with dialog and sound effects as long and as startling as old what's-his-name's spirited description of the siege of Troy, or the other one about Horatius holding the bridge.

"Do you know, I often have thought Horatius missed a bet there. He could have saved himself a lot of hard work and a hurried dip in the river if he only had the forethought to stick up a sign BRIDGE CLOSED FOR REPAIRS. Detour to 172nd street and Birdseye boulevard.

"Talking about battles, murder and sudden death brings to mind one of the standard anecdotes. Through one of the well known frailties of human nature this adventure always occurred not in the narrator's shop, but in that of a competitor. Invariably the speaker is willing, if necessary, to pledge his immortal soul that the story is true. In evidence whereof he quotes the exact date and true names of the parties involved.

"Joe (Snuffy) McGoozlum, also known as the Pelican on account of how he puts down his feet and waddles from side to side, well, anyway this here now Pelican waddles into town one day last fall and after making a round of all the saloons, he makes a round of the shops. An old campaigner and a competent mechanic Joe can work any where, dog house, side floor, bench or under the big hook. This time he ain't feeling so hot. He figures on ketching a job on a side floor not too far from the cupola where three or four hand ladles will pour him off. He sizes up all the places as he goes along and makes mental note of the advantages and disadvantages of the various joints. Finally he comes to the Vulcan down near the river and the biggest shop in town. This place has a kind of a tough reputation, but Joe has been in so many queer joints at one time or another that he figures he can get by all right. His stay only would be temporary, a kind of touch and go experience. If he could not get a job he would touch the boys for a hand out and hop the rattler for the next town. What had he to lose? Why, nothing and there y'are!

"Scornfully ignoring the front office he oozes through a hole in the fence, ducks through the flask yard and into the sand shed. In careless and nonchalant disregard of one sign which says KEEP OUT, THIS MEANS YOU and another prohibiting smoking, he lights a cigaret, cocks the old kelly at a proper fighting angle and strolls down the main gangway. With unerring instinct he spots the old man, the bull of the woods, and greets him briefly and courteously: 'Hiya podner. How's chances for a job?'

"The gaffer turns the fish eye on him and politely inquires: 'And who are you? How in the (A naughty four letter word when used in the foundry, but perfectly legitimate when used in the pulpit) and how in the—ah—word, did you get in and what kind of a job do you want?'

"Joe removes the cigaret butt dangling from the lower lip, tips the iron kelly forward another half inch and modestly admits that he is a A-1 molder. He has no documentary or other evidence to sustain the claim and it is extremely doubtful if he ever heard of anything of that kind. Isn't his word good enough?

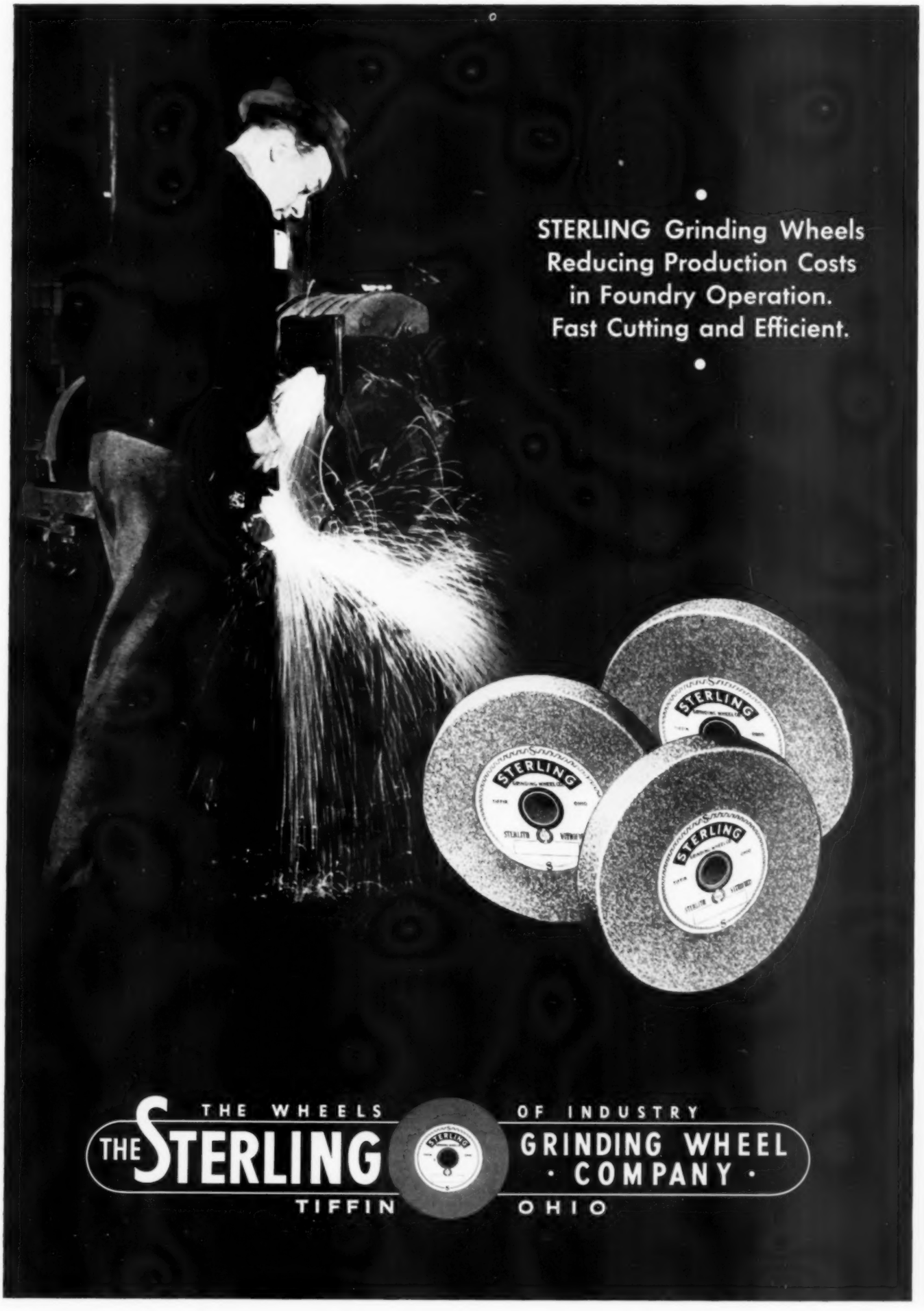
"The old man takes a look up and down the shop and says he is not sure if he can put him on or not. Three of his men had been killed that morning, but they were only laborers. Of course they left temporary gaps in the ranks, but he would not ask the Pelican to fill one of these gaps. However, he told Joe to stick around for a while. One of the molders was bound to be killed or crippled during the day and he could have the job.

"Joe did not wait. He told old pickle puss he would be right back. He had to go out and get a cup of coffee. Then he would return and make the sand fly. 'O.K.' says the pusher 'Make it snappy. One of these (deleted by censor) birds is apt to get knocked out any minute.'

"Joe threw out his chest, waddled down the gangway, through the sand shed, the flask yard and out through the hole in the fence like the well known cat flying out of the dairy window. With every step his speed increased until he arrived at the railroad water tower. Fortunately a freight was just pulling out and Joe had just strength enough left to pull himself in through the door of one of the side door pullmans. He crossed the

(*Concluded on page* 96)

Slightly revised version of how well Horatius held the bridge in the brave days of old


STERLING Grinding Wheels
Reducing Production Costs
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Fast Cutting and Efficient.
STERLING
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GRINDING WHEEL
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ADVERTISING PAGES REMOVED

AMONG DETROIT FOUNDRIES

By A. H. ALLEN
Detroit Editor, The Foundry

OMER L. ALLEN who, as announced in THE FOUNDRY for November, has been appointed superintendent of the Pontiac Motor division foundry at Pontiac, Mich., was reminiscing the other day about early experiences in the automotive foundry business. He has seen a quarter of a century go by in this field, almost entirely in the foundry of Wilson Foundry & Machine Co., Pontiac, where he left the superintendency recently to go with Pontiac. He learned the molding trade at the gray iron foundry of Rutenberg Motor Corp., Logansport, Ind., and became assistant foreman. In 1914 he became foreman at the Maxwell foundry, Dayton, O. A year later he joined the Wilson organization as foreman.

Looking back over the old days, Mr. Allen said "It has been interesting to watch the automobile business grow. In those early days we made six cylinders a day per man. They weren't cast in blocks then, but were made singly. Today, the output averages 19.2 cylinders per man per day at Pontiac.

"We didn't have our own metallurgists or laboratories. Cylinders were ordinary cast iron and only about 25 per cent of a cupola heat was good castings. Today, 75 per cent is good. We sent test bar borings to a consulting metallurgist in Chicago who made determinations for us. Until we had his report we kept on using the same mixture. Now we make tests every hour and employ two full time metallurgists in the foundry day and night, in addition to those in engineering and other departments who also check our work.

"Even with our slow and antiquated methods of 20 years ago, we held the cylinders to pretty close accuracy. We'd make up a batch, wait until they were all sold and then make some more."

This is the time of year when retrospection is in order, particularly in view of the fact American industry has just completed another decade of progress. Despite the turmoil and strife of the years 1930-1940, industry's technicians kept everlastingly at their problems, with the result that foundries of 1940 differ to remarkable extent from those of 1930.

Omer L. Allen
—Reminisces on early experiences

The automobile industry is entitled to a major share of credit for inspiring and stimulating foundry progress during a ten year period ranging from the deepest slough of depression to the pinnacle of prosperity. Ten years have seen a total of 32,384,700 motor cars and trucks produced in this country, or about 2,000,000 more than present total vehicle registrations. An average of 500 pounds of castings per car, represents a foundry output of 8,000,000 tons of finished castings, or a gross melt of perhaps 10,000,000 tons in this 10 year period.

Experts reviewing foundry progress list better control of melting processes, increasing use of automatic blast control equipment, improved mechanical charging methods, wider use of mixing ladles and covered insulated ladles as some highlights of recent achievements in metal production departments. Other divisions show further development and application of special molding equipment, control of properties of molding sands with emphasis on use of all purpose synthetic sands, greater use of copper in alloy gray iron, development of ferroalloys containing carbide forming elements and economical graphitizing elements, flame hardening of parts of heavy-sectioned castings, and induction heating and quenching for high surface hardness.

Demands of the automotive industry for better quality, lower cost and healthier working conditions

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(*Concluded from page* 54)

have been a potent influence in the mechanization of foundries, both large and small, and in the more general adoption of metallurgical and chemical control methods.

What the next ten years will bring, no one can say; but certainly there will be added improvements in all the fields mentioned. It may be a good bet to hazard the prediction that machine casting of gray iron, malleable and steel in some new type of permanent mold will arrive commercially before 1950.

Constant and unremitting search by the automotive industry to improve the longevity of its wares was illustrated amply at a recent joint meeting of the Detroit chapters of the A.F.A. and S.A.E. held on Dec. 4. Over 300 members and guests participated in a discussion of the relation of engine wear to microstructure and hardness. Observations on microstructure, composition, hardness and wear of cast iron cylinder bores were presented in two papers prepared by E. K. Smith, metallurgist, Electro Metallurgical Co., New York, and Paul S. Lane, research engineer, American Hammered Piston Ring division, Koppers Co., Baltimore.

Wear Related To Structure

Microstructure study presented by Mr. Smith was undertaken on new motor blocks and on those which had a definite mileage and measured wear, in the effort to throw light on the following problems: (1) What is the actual structure of the present-day cylinder bores at the point of maximum wear; (2) how does variation in structure actually affect wear; (3) what is the most desirable structure for cylinder bores, having in mind such major considerations as machinability and cost, as well as wear; and (4) how can such structures be obtained practically?

Ten motor block sections were obtained from 8 different cars. Chemical analyses and micrographs were made and studied. Samples were taken at a spot ½-inch from the top of the bore on the side of either No. 2, No. 5 or No. 7 cylinder. Then bores with measured mileage and wear were analyzed similarly. Three micrographs were made of each spot. The first at 100 diameters, unetched, showed graphite formation; the second at 100 diameters, etched with nital, showed the general structure components; and the third at 1000 diameters, etched with nital, showed the detailed structure for study of wear.

Certain postulations were made from Mr. Smith's investigation: Irons with flake graphite give the best wear; irons with large amounts of ferrite give poor wear with the wear increasing directly as the amount of ferrite; irons with a ferrite-fine graphite structure gave the worst wear; and irons with excessively coarse graphite gave porous bores. Though no direct relation between wear and structural components was ascertainable, nevertheless it appeared the actual structure has an important relation to the wear of the cylinder, and brinell hardness is of importance in enabling foundrymen to control the structure, as well as for other purposes such as control of machinability.

Occasionally a bore is machined which exhibits small defects and the block is scrapped as *porous bore*. Frequently this difficulty is caused by excessively coarse graphite, resulting from too high silicon or carbon. The machining operation tears out iron between coarse graphite flakes and gives a rough appearance to the bore.

Causes of cylinder bore wear, including abrasion, corrosion and structure, together with suggested cures, were reviewed by Mr. Smith. He pointed out that in many cases the objectionable ferrite-fine graphite structure can be eliminated by the addition of ferrosilicon or ferromanganese-silicon or other graphitizers in the ladle. Additions of balanced alloys containing chromium and various graphitizers also are giving promising results, as are combinations of molybdenum-chromium and nickel-chromium.

As a preferred microstructure, having in mind machinability, cost and especially resistance to wear, Mr. Smith recommended one which at the position of maximum wear, consists of an entirely pearlitic matrix with long, thin flakes of normal graphite, no ferrite and sufficient particles of the double iron-chromium carbide to increase resistance to wear.

To obtain in the laboratory some conception of the mechanics of wear in cylinder bores, Mr. Lane devised a unit of the brake shoe type having a revolving drum, representing the engine cylinder, against which is held the test piece of specimen, representing a piston ring, for example. The specimen is loaded with 5 pounds and a linear speed of 1375 feet per minute is maintained.

Wear is determined by weight loss of both the drum and the specimen proper, and from many hundreds of determinations on irons of various types it has been possible to establish an arbitrary table of weight loss values, giving a valuable index of probable wear resistance of the material under conditions of dry operation. Subject to many exceptions, Mr. Lane offered the following values as representing average wear with American automotive engines:

Cylinder wear per 10,000 miles—0.001-0.003-inch diameter increase.

Piston ring wear per 10,000 miles—0.003-0.005-inch diameter decrease.

Present practice in automotive engines calls for brinell hardness of 230-260 in piston rings, against 175-230 for bore sections, thus utilizing rings which are harder than cylinders even though it is desired to have the rings "give way" to the cylinders and take the major part of wear. Two explanations are possible. First the rings, even though harder than the bores, are of a structural type which wears faster; and second, the cylinder material, though softer, tends to throw more wear on the opposite rubbing surface. These conclusions are demonstrable by the dry rubbing tests.

Depends on Many Variables

Reviewing his data, Mr. Lane acknowledged that recommendations for improvement of wear were limited, but only served to illustrate that the subject of wear remains elusive, complex and dependent on almost innumerable variables. Though *practice*, in regard to resisting wear, is far ahead of *theory*, he was inclined to the viewpoint that an improved understanding of the nature of the materials now being used in engines is a good step toward finding or creating better ones.

Where-to-Buy

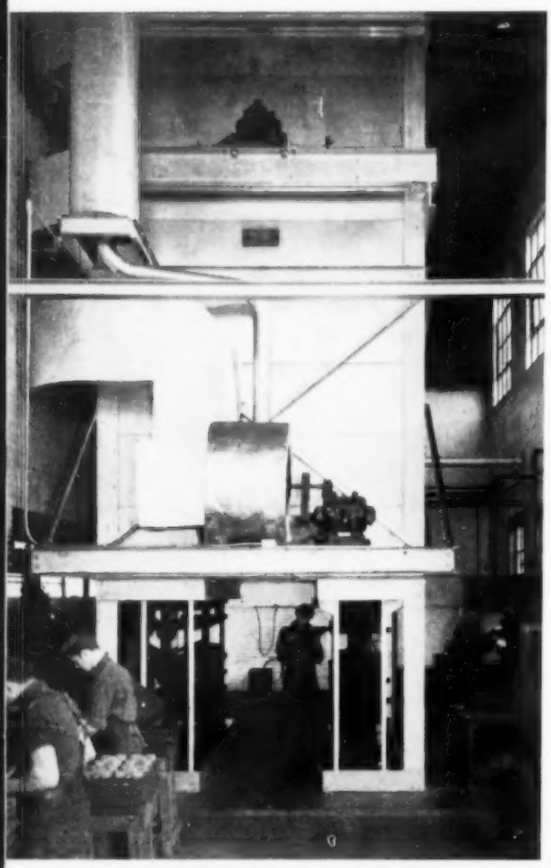
FOR the convenience of its readers THE FOUNDRY presents in each issue an alphabetical list of products under the title "Where-To-Buy." Refer to these pages for sources of supply on any equipment, accessories or supplies in which you may be interested.

The Where-To-Buy directory in this issue begins on page 103.

Bureau of Mines, Washington, recently has published economic paper No. 19, entitled "The Iron and Steel Industries of Europe," by Charles W. Wright. The bulletin contains 98 pages and gives data on ore reserves, production and consumption, coal fields, iron and steel plants, and other pertinent information.

Indiana Foundry

HOLDS OPEN HOUSE



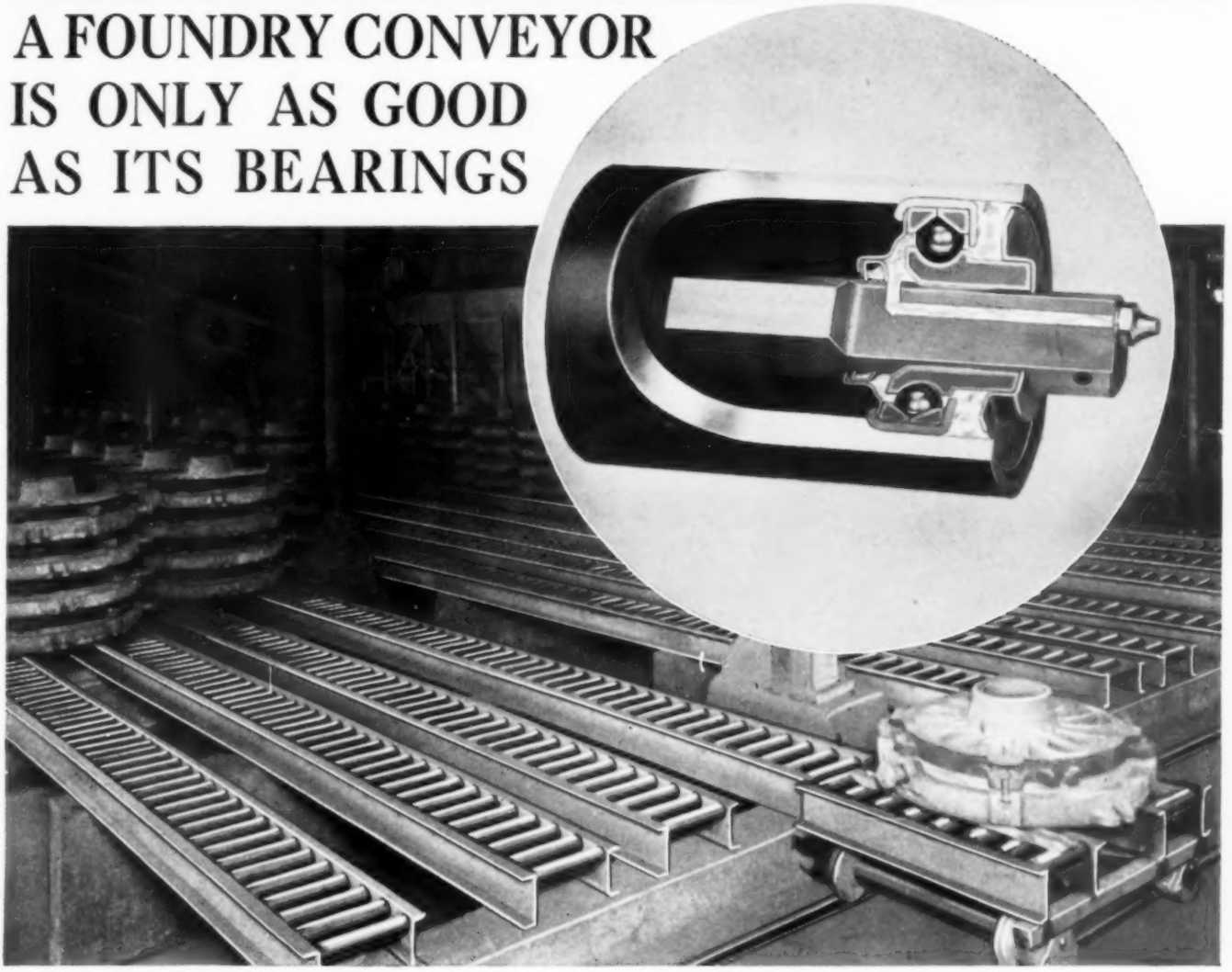
RESPONDING to a cordial invitation from the Decatur Casting Co., Decatur, Ind., 2236 visitors attended an open house Nov. 25, and saw for themselves how castings are made in a modern foundry where more than usual effort is directed toward hygienic surroundings, maintenance of robust health and prevention of accidental injury to the employes. To facilitate handling the large crowd, the program was divided into two parts. Employes and members of their families were conducted through the plant from 9 to 11 a. m. Invited guests, customers, designers, buyers and users of iron castings and the public generally who might be interested, were entertained during the afternoon session originally scheduled from 12 to 3, but actually extended to 5:30.

Above, Left—Henry A. Rentschler, Peter E. Rentschler Don McDaniel. Right—Guy Tester shows safety shoe to H. E. Bromer. Left, Center—New vertical type core oven. Below, Left—Don McDaniel. W. W. Rose, B. O. Fink, president Auburn Foundry Co., Auburn, Ind., Below, Right—Peter E. Rentschler holds the close attention of W. Harvey Payne, representative of Foundry Equipment Co., Cleveland, and N. F. Hindle, technical secretary, American Foundrymens association, Chicago

The foundry includes two main buildings each 78 feet wide, erected at right angles to each other and joined at one end to form an *L*. The main building is 224 feet in length, while the second building, or west bay is 258 feet from end to end. Visitors entered through the pattern shop west door, passed through the various departments explained by guide and placards, and concluded a highly interesting and instructive tour in the time clock room at the south end of the main building. At one stage of the tour they were shown molders making and casting small souvenir paper weight castings. Just before leaving the building each visitor was presented with one of these castings, taken from an extensive collection labeled *Something To Crow About. Decatur Quality Castings.* The casting was a miniature replica of the proudest and most militant member of the animal kingdom, a term which embraces everything which walks, swims or flies, a noble barnyard rooster, lacquered a modest gray, with the excepting of the comb a brilliant red.

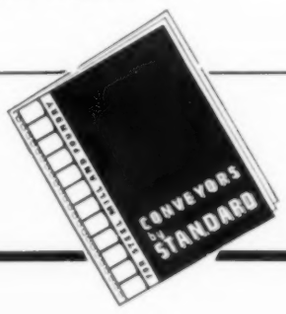
(*Continued on page* 60)

A FOUNDRY CONVEYOR IS ONLY AS GOOD AS ITS BEARINGS



A NATION-WIDE SERVICE IN CONVEYOR ENGINEERING

"Conveyors by Standard for Steel Mill and Foundry". Bulletin F-1—a valuable reference book on conveyors and conveying methods. Sent free to foundry executives upon request.



Design and construction are vital to successful foundry conveyors, but Standard Engineers, with years of experience and special knowledge of the conditions involved, know that a foundry conveyor is only as good as its bearings. Every Standard Roller Conveyor is equipped with specially designed bearings that provide a maximum of protection and durability in foundry service.

The careful handling of molds requires bearings that reduce vibration. Spillage of iron must be guarded against—steel shields on Standard bearings provide this protection. In addition to these important advantages Standard Conveyor bearings are grease sealed, which not only reduces wear and retards rust on the bearing, but also prevents the entrance of dust, sand and grit into the bearing.

There is a Standard Engineer near you. Call him in, or, if you prefer, write for Bulletin F-2 "Conveyors by Standard for Steel Mill and Foundry."

STANDARD CONVEYOR COMPANY

General Offices: North St. Paul, Minn.

Left—Molding the souvenirs. Bunting was employed extensively. Cores made on bench and on core blowing machines

(*Continued from page* 58)

Many prominent customers of the company contributed materially to the success of the general program by a display of finished pieces of domestic and outside mechanical equipment in which Decatur Foundry castings were incorporated. The list arranged alphabetically includes: American Lawn Mower Co., Muncie, Ind.; S. F. Bowser & Co., Inc., Fort Wayne, Ind.; Delco Products Division of General Motors Corp., Dayton, O.; Goldman Pressing Machine Co., New York; Great States Corp., Shelbyville Ind.; Magnavox Co., Inc., Fort Wayne, Ind.; Sherman-Manson Mfg. Co., St. Marys, O. and Chicago; Warner Machine Products Inc., Muncie, Ind.; Westinghouse Electric & Mfg. Co., Lima, O.

Indiana state board of health, quite familiar with the excellent sanitary and hygienic conditions prevailing in this foundry, gladly contributed to the program by supplying posters for display and health literature for distribution to the visitors at the morning and afternoon sessions. Peters Branch International Shoe Co., St. Louis, had various types of safety shoes on exhibition, some cut in section to show construction of the safety features.

Display of cores, molds and castings was arranged in a manner similar to the foundry permanent exhibit recently set up in the Chicago Museum of Science and opened to the public during the second Chicago chapter, A. F. A. regional conference, Nov. 9, 10 and 11.

A collection of safety appliances and equipment and a permanent, electric lighted display case labeled *Protective Safety and Health Devices* showed that the company is cognizant of the many potential hazards in the daily occupation and has taken every reasonable precaution to prevent accidents. A number of partly shattered goggles presented grim reminder of the necessity of guarding the eyes. Other pieces of used equipment bore similar testimony to their efficacy in time of need.

With careful planning in advance and with close attention to details of a time schedule, the large number of visitors were passed through the plant in a highly satisfactory manner. A competent guide accompanied each group, directed attention to the various items, methods, materials and pieces of equipment and answered all the questions including that of the lady who asked if the coremaker used crisco or lard to grease the pans in which the cores were baked.

Below—Ed Rich demonstrates operation of a device used in cleaning automotive castings at the Decatur foundry

Additional publicity was given the event at the registration desk where each visitor was given post cards to be signed and addressed to a friend or acquaintance. In neat script the card carried a message: "Sorry I didn't see you here at the Decatur Casting Co., Open House today. Regards." A total of 3671 cards were stamped and mailed at the company's expense to practically every state in the union and to several foreign countries.

Itinerary began in the pattern shop and followed in logical sequence through the molding, melting, coremaking and cleaning departments. In the coremaking department attention was directed to a vertical continuous core oven, oil fired and recently installed by the Foundry Equipment Co., Cleveland. The oven operates at 500 degrees Fahr., and the cores move at a speed of 0.36 foot per minute to make a complete cycle in 1 hour, 40 minutes.

Decorated with Flowers and Flags

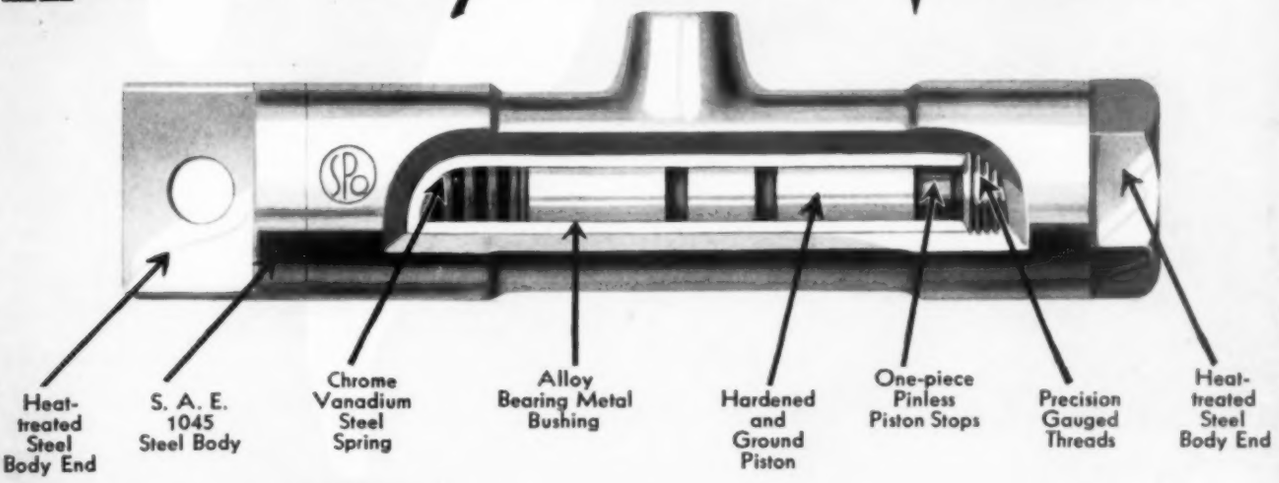
Draped flags and bunting conferred a gay and festive air to otherwise prosaic surroundings. Dozens of baskets of gorgeous chrysanthemums and pompoms presented by friends of the company and in keeping with the fall season, were arranged between and around the various exhibits. Each employe and each member of his family wore a special celluloid badge 2¼-inch in diameter.

Souvenir castings were handed departing visitors by Mrs. Don McDaniel and Mrs. Peter E. Rentschler. They were assisted—occasionally—by young Peter and Jim Rentschler and Bill Bromer. These able disciples of Dan Beard found another type of one good deed for the day more to their liking. Restless energy of youth kept them in constant motion distributing lollypops to the children. Practically all the parents, past, present and future, heroically insisted on sampling the jaw breakers before exposing the children to this insidious form of propaganda. All of which is just another way of saying that in addition to informative value, the Decatur Casting Co., open house was a huge and hilarious success.

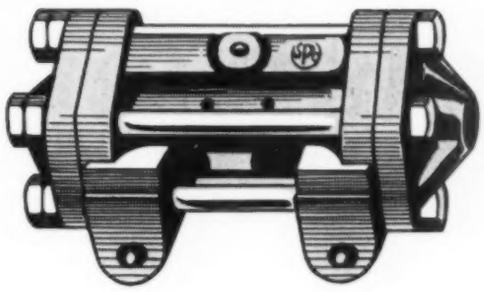
All of the supervisory force and office personnel of the Hamilton Foundry & Machine Co., Hamilton, O., with which the Decatur Casting

(*Concluded on page* 62)

How would *You* make a Vibrator . .


Heat-treated Steel Body End
S. A. E. 1045 Steel Body
Chrome Vanadium Steel Spring
Alloy Bearing Metal Bushing
Hardened and Ground Piston
One-piece Pinless Piston Stops
Precision Gauged Threads
Heat-treated Steel Body End

WOULDN'T IT BE PRETTY MUCH LIKE *this* ?



1⅝" SPO Vibrator

YOU would select enduring materials . . . Please check the SPO construction points itemized above: high carbon forged steel body, heat-treated steel ends, special alloy bronze liner (broached and burnished), special alloy steel plunger.

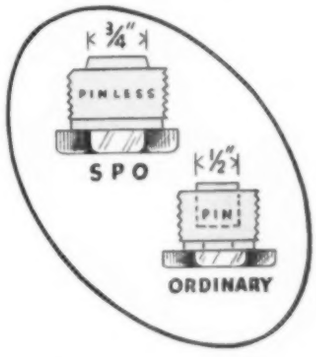
You would eliminate trouble-causing parts . . . As a striking example, observe the one-piece piston stop ("anvil") *exclusive with SPO.* It has no pin to work loose. This is typical.

You would do away with the necessity of lubrication . . . With SPO vibrators, the oil and water in your air line take care of that chore.

You would build a balanced unit . . . SPO vibrators strike equally hard at both ends. They do not fail prematurely at one end.

You would insist upon uniformity of parts and their correct interrelating . . . The SPO centerless ground piston is ground to a mirror-like finish, permitting exceptionally close tolerances and almost frictionless operation. This is typical.

For profitable operation and long life, *give SPO vibrators a good trial.*



SPO vibrators are stocked in ½", ⅝", ¾", 1", 1¼", and 1⅝" sizes. Special types and sizes are readily available.

SPO

INCORPORATED

Manufacturers and Specialists in Molding Machines, Vibrators, and Patterns for Production

East 61st Street and Waterman Avenue · · Cleveland, Ohio

ADVERTISING PAGES REMOVED

(*Concluded from page 60*)

Co., is closely associated, drove up from Hamilton in a chartered bus. Particularly interested was Henry A. Rentschler, dean of the casting industry in southern Ohio, secretary and treasurer, Decatur Casting Co., secretary and treasurer, Hamilton Foundry & Machine Co., and president Citizens Savings Bank and Trust Co., Hamilton, O.

Display of safety posters at left and below group of visitors signing the souvenir post cards

Decatur Casting Co., was incorporated in 1920 by Peter E. Rentschler, representing the third generation of a family prominent in the foundry industry of Ohio for many years and dating back to 1875 when a partnership was formed as Sohn and Rentschler. In 1891 George Adam Rentschler with his son Henry A. Rentschler organized the Hamilton Foundry & Machine Co., to take care of excess precision castings from the parent company. In 1907 Gordon S. Rentschler, president National City Bank, New York, joined the company and in 1918 Don McDaniel came from the Link-Belt Co., Indianapolis where he had served as plant engineer for 8 years.

Executive officers of the Decatur Casting Co., include: President, Don McDaniel; vice president, George A. Rentschler; secretary treasurer, H. A. Rentschler; assistant secretary-assistant treasurer, Peter E. Rentschler.

In the three views at the left, the first shows H. Millisor unloading cores from the shelves of the new continuous vertical oven. Center, part of the collection of souvenir roosters. Bottom, case of protective safety and health devices on the wall outside blasting room

Iron Founders Hold Cost Clinic

Gray Iron Founders' Society, Inc., held its second gray iron cost clinic at the Bismarck hotel, Chicago, Dec. 5. The clinic covered the subjects of, "Distribution of Foundry Expense Items," and also, "Cost of Metal Melted." An interesting method of handling the cost of metal melted has been evolved, and the variations in the component parts has prompted studies on the part of several individuals to determine why some items should be excessive. The interest centered on materials, labor and supplies.

The many gray iron foundry representatives in attendance recorded their enthusiasm by not permitting adjournment of the meeting until close to midnight. A poll of those in attendance was overwhelmingly in favor of continuance of the clinics, and as a result, the "Molding Department" has been selected as the subject for discussion at the next meeting to be held at the same place, Tuesday, Jan. 16.

The cost clinics are being directed by Charles I. Ritchie, executive secretary of the Gray Iron Founders' society.

Detroit

HOW careful attention to "human relations," including selection of men for employment, checks on health, and promotion of safe and sanitary working conditions, has paid dividends in continuity and steadiness of employment at the Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., was explained to 100 members and guests of the Detroit chapter at its November meeting by George Cannon, a founder of the company; E. W. Beach, engineer; William Barclay, personnel manager; and Dr. C. M. Colignon, head company physician. They were introduced by Vaughan Reid, City Pattern Works, Detroit.

Sequence of photographs appearing in THE FOUNDRY for November portrayed many aspects of the thorough program of examination pursued by health and personnel authorities at this progressive foundry. Dr. Colignon pointed out that all prospective employes are given a thorough physical examination before hiring and are divided into four classes according to physical fitness, regular re-examinations being made on a schedule of 18 months to 2 years. Where physical defects are found, they are explained to the men and treatment is referred to family physicians.

Mr. Barclay explained the mechanism of the employes' aid association, insurance, welfare and activities, credit union, safety practices and good housekeeping, and extra curricular activities such as athletics, musical organizations, etc. How effective the combination of these two phases of employe assistance has been is testified in the company's record for 10 months of this year in which the ratio of hours lost by injuries and sickness to hours worked descended to an all-time low of only 0.02 per cent.

An interesting phase of the company's personnel activities is the credit union, a form of savings and loan association, into which an average of 1500 employes have placed savings of $75,000 in less than 4 years. Funds are used to make loans to needy employes at a rate of 1 per cent per month on the unpaid balance. Employes disabled through noncompensible accidents are eligible to receive $120 yearly for 3 years, paid out of a welfare fund established by the company.

Prior to the technical discussion Harry W. Dietert, chairman of the chapter, introduced Robert E. Kennedy, secretary, American Foundrymen's association, Chicago, who spoke briefly on association activities and urged attendance at the spring convention in Chicago.—*A. H. Allen.*

Four representatives of the Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., addressed the November meeting of the Detroit Chapter of A.F.A. From left to right: Dr. C. M. Colignon, head physician; George Cannon, vice president and a founder of the company; E. W. Beach, engineer, and William Barclay, personnel manager. Illustration courtesy Vaughan C. Reid, metallurgist, City Pattern Works, Detroit

Birmingham

REGULAR meeting of the Birmingham District Chapter of the A. F. A., was held Nov. 17 at the Tutwiler hotel, Birmingham with approximately 65 members present. R. C. Harrell, Stockham Pipe Fittings Co., and chairman of the chapter, presided. C. K. Donoho, American Cast Iron Pipe Co., and program chairman introduced the principal speaker, Donald J. Reese, International Nickel Co., New York, who spoke on, "Cupola Practice."

Mr. Reese's discussion was mose interesting and was accompanied by illustrative slides which dealt with the several phases of the operation of a cupola. He presented highlights on the relationship between cupola diameter and weights and sizes of materials entering the charge; outlined the various functions of the coke bed; pointed out a relationship between coke and quality of iron produced; and also described the several methods used to tap a cupola.—*Farrar Hill, chairman, publicity committee.*

Cincinnati

DAYTON extension meeting of the Cincinnati District Chapter of the A. F. A., held Nov. 14, was very successful inasmuch as 167 assembled for dinner at the Hotel Biltmore, Dayton, O. Hosts were the members of the Dayton Foundry club and all present were welcomed by the club's chairman, Dave Finn. Mr. Finn introduced Dr. Arthur Marcus, known as the Mad Magician, and he produced many surprises and his performance was enjoyed by all.

Following a short intermission and business meeting, the meeting

was turned over to the chairman of the Cincinnati chapter, Herman K. Ewig, Cincinnati Milling Machine Co., Cincinnati. Mr. Ewig expressed the appreciation of the Cincinnati group for its wonderful reception. He explained the history of the Cincinnati chapter and its future program, and invited all those who had not yet become affiliated with the chapter to do so in the near future.

The feature talk of the evening was presented by Frederick G. Sefing, development and research engineer, International Nickel Co., New York. Mr. Sefing spoke on "Factors Affecting the Production of Cupola Irons."

From the group assembled it was determined that foundrymen present were from the following Ohio cities: Dayton, Piqua, Troy, Miamisburg, Springfield, Middletown, Wilmington, Hamilton, Overpeck, Zanesville, and Lancaster, and from Covington, Ky. and Detroit. Three buses were used to bring the 85 members from Cincinnati. An entertainer was provided for each bus. Song sheets were distributed and the harmony was unusual.—*E. T. Korten, secretary.*

N. Ill. and S. Wis.

APPROXIMATELY 85 members attended the Nov. 14 meeting of the Northern Illinois-Southern Wisconsin Chapter of the A.F.A., held at Hotel Freeport, Freeport, Ill. G. J. Landstrom, Sundstrand Machine Tool Co., Rockford, Ill., and chairman of the chapter presided. "Defective Castings—Causes and Remedies," was discussed by A. J. Busch, Charles C. Kawin Co., Chicago.

Mr. Busch's paper outlined the various causes of scrap and then gave remedies. The foundry practices that could cause scrap and must be controlled are: Metal mixtures, melting practice, gates and risers, cleaning, casting design, and patterns. In some cases, castings must be considered separately, and tricks employed to produce sound castings. The paper was followed by a discussion period during which many foundry problems were discussed.—*H. C. Winte, technical secretary.*

Southern California

SUBJECT of grinding wheels was discussed by Dick Hughes, Pacific Metals Co., Los Angeles, at the Nov. 16 meeting of the Southern California Chapter of the A. F. A., held at the Elks club, Huntington Park, Calif., with approximately 85 present. Mr. Hughes gave the history of abrasive grinding wheels. Following the formal presentation Mr. Hughes and C. G. Emory, Macklin Co., answered questions at a general round table discussion.

Glen Merrifield, Warman Steel Casting Co., announced the opening of the foundry training course in conjunction with the Los Angeles high schools. Also, an all sound, all color motion picture entitled, "Die Casting the Modern Way," was presented through the courtesy of Harvill Aircraft Corp.—*W. F. Haggman, secretary.*

Twin City

THE Twin City Foundrymen's association held a joint meeting with the American Society for Metals Nov. 15, at the University of Minnesota, Minneapolis. An open meeting was held following dinner in the Minnesota union, where approximately 200 were present. Hyman Bornstein, director of research, Deere & Co., Moline, Ill., discussed, "Cast Iron." His lecture covered the various phases of cast iron including high test cast iron, alloyed cast iron, and malleable cast iron, and the lecture was illustrated with numerous slides. Following the talk was a round table discussion for about 30 minutes which brought out further points of interest.

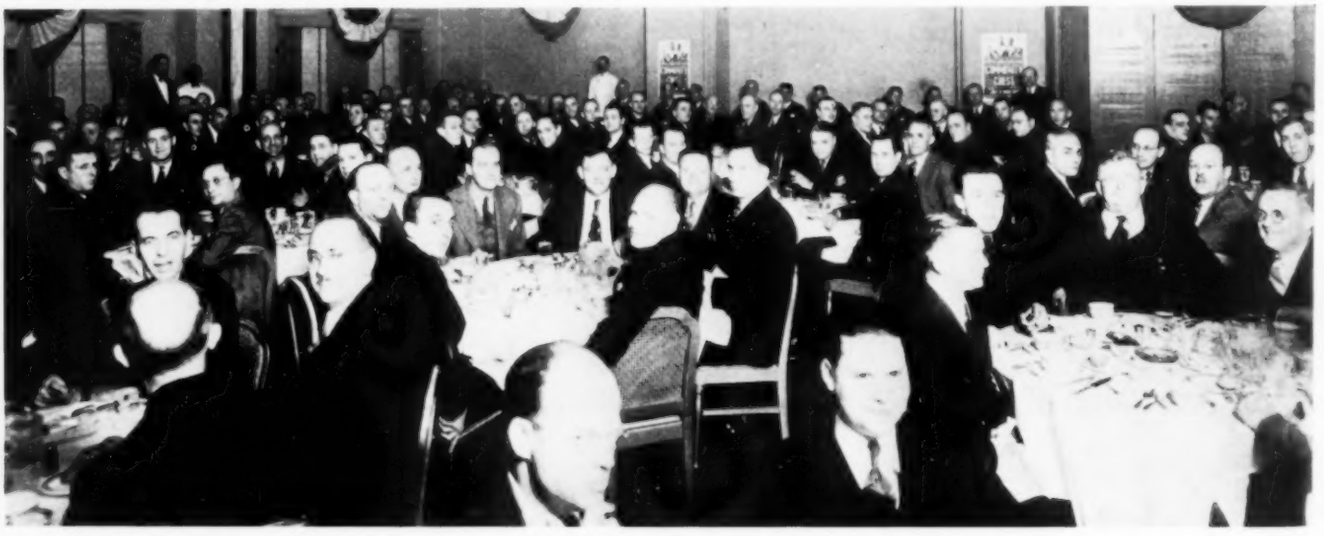
First Fall meeting of the association was held at the North Central Commercial club, St. Paul, Sept. 18. William B. George, Lavin Metal Co., Chicago, was the principal speaker and he discussed, "Brass Foundry Practice." Mr. George included in his talk many examples of actual experience which had come under his observation in the many years he has been working with the brass foundries.—*O. W. Potter, secretary.*

Northern California

REGULAR monthly meeting of the Northern California Chapter of the A. F. A., was held on Friday evening, Nov. 10 at the Alexander Hamilton hotel, San Francisco with 32 members and guests present to hear an illustrated lecture on, "Hydro-Electric Development in the Northwest."

The speaker, Samuel Brooks Morris, dean of engineering, Stanford university, is an authority on the subject. He has devoted many years to the building of multiple purpose dams and because of his knowledge, he was called by the United States government as a consultant on the preparation and building of the Columbia river projects. Dean Morris brought the foundry industry into the picture by showing the part played by castings, large and small, that have to meet most exacting requirements. S. D. Russell, Phoenix Iron Works, Oakland, Calif., and chairman of the chapter presided. Past chairmen of the chapter present at the meeting were John D. Fenstermacher and

(*Continued on page* 68)



An excellent group turned out for the Dayton Extension meeting of the Cincinnati chapter

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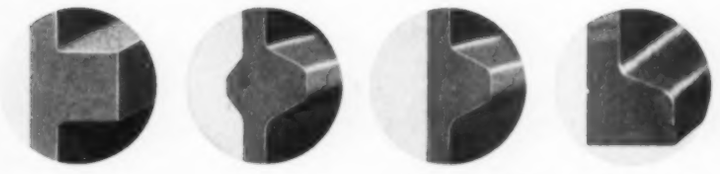

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(*Continued from page* 66)

Charles Hoehn, Mr. Hoehn, as a director of the A. F. A., outlined the association's program for taking a major part in the fifteenth annual steel conference to be held in Del Monte, Feb. 8 and 9, 1940. The conference is one of the outstanding features of the California State chamber of commerce and is under the direction of Charles Knight, secretary of the industrial division. —*George L. Kennard, secretary.*

Chicago

DECEMBER meeting of the Chicago chapter of the A. F. A. was held in the Celtic room, Chicago Towers Club, with C. C. Carlton, vice-president and secretary, Motor Wheel Corp., Lansing, Mich., and president, Automotive Parts & Equipment Manufacturer's association, as principal speaker.

Prior to Mr. Carlton's address Chairman C. E. Westover, Burnside Steel Foundry Co., Chicago, reported on the success of the regional conference, Nov. 9-11 in Chicago and complimented conference chairman L. H. Rudesill, Griffin Wheel Co., Chicago, and his committee on their fine work.

A. W. Weston, Chicago Foundry Co., Chicago, and chairman of the lecture course committee, stated everything was coming along fine with the plans for the course. The course begins Jan. 15 as announced elsewhere in this issue.

The annual Ladies' Night party will be held at the Medinah Club on Feb. 2, it was announced.

Program chairman G. P. Phillips, International Harvester Co., Chicago, introduced Mr. Carlton, whose topic for the evening was "What Are We as Manufacturers Up Against, And What Can We Do About It?", being a discussion on today's labor situation in the automotive industry.

Industry must become vocal, according to Mr. Carlton, by raising the funds to educate the public to a knowledge of what free enterprise means and why it must be preserved. Industry also must strive to employ the greatest number of persons possible and at the best wages possible, to defend the profit motive, to reduce production costs so that the price of the product will be fair to consumers, to pay for research that employment and consumption might be stimulated, and to maintain fair employe-employer relations.

W. J. Cameron, Ford Motor Co., will address the group at the Jan. 8 meeting of the chapter on some present day problems of industry.—*J. F. Powell*

Pittsburgh

STATISTICAL picture of the scrap industry and the part it plays in the foundry field was discussed by E. C. Barringer, executive secretary, Institute of Scrap Iron & Steel Inc., New York, at the November meeting of the Pittsburgh Foundrymen's association. In addition, the 75 present were shown a sound movie of steel production from the mine to finished products, prepared by United States Steel Corp.

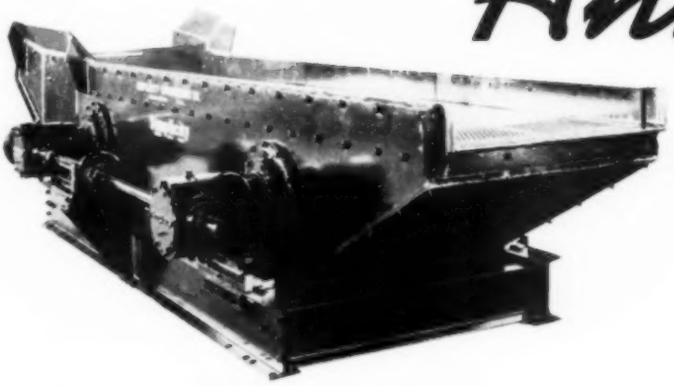
Indicated consumption of iron and steel scrap by all classes of foundries in 1939 was placed at 6,800,000 gross tons, an increase of 36 per cent over the 5,084,932 tons melted in 1938, according to Mr. Barringer. Foundries consumed 4,340,000 tons of pig iron in 1939 against 2,598,047 tons in 1938.

From 1935 to 1938 inclusive, foundries melted 25,364,440 gross tons of scrap, of which 13,451,240

(*Continued on page* 70)

Various views taken at the Chicago regional conference held at the Museum of Science and Industry. Photographs courtesy E. F. Weichmann, Whiting Corp., Harvey, Ill.

Announcing!



AN EFFICIENT METHOD OF MOVING HOT CASTINGS

THE SIMPLICITY GYRATING CONVEYOR

Simplicity Hot Casting Conveyors have been in service in a large tonnage production shop for nearly six years. In that length of time, they have proven their efficiency and ability to meet the difficult conditions incurred in the conveying of red hot castings. Standard type of conveyors had been tried, but the natural results of high heat conditions caused considerable maintenance expense as well as costly delays in operation. These expenses and delays were greatly reduced by the installation of the Simplicity Gyrating Conveyors.

The construction of the Simplicity Gyrating Conveyor is such that the expansion and contraction of the metal parts, caused by the heat of the castings, in no way affect the continuous and efficient operation of the conveyor. The castings are vibrated over the surface of the conveyor, rather than the conveyor surface moving and carrying the castings.

This vibration, which is somewhat similar to the action of the Simplicity Shake-Outs, gives additional cleaning to the castings. With the castings in movement, instead of being stationary on the conveyor, cooling air can more readily remove the heat from the castings. Enclosures, such as illustrated in the cut, permit the dust and heat to be rapidly removed, thereby aiding greatly in improving the working conditions for the shake-out crew, as well as for the entire shop.

The illustration also shows how the receiving containers can be heaped full with castings without any chance of damage to the conveyor or castings. In this particular case, 25% more castings are handled in the buckets, than could be handled before their conveyors were replaced with Simplicitys.

Standard conveyor units are 30″ wide and range in length from 12′ up to 30′. Should a greater length of travel be required, two or more units mounted in tandem will provide any length of gyrating conveyor. These Simplicity Conveyors usually are used to take castings from one or more Simplicity Shake-Outs, but can be used for any type of casting conveying.

Economy and efficiency of operation alone more than justify the installation of these conveyors, and when the savings from producing cleaner and cooler castings are considered, it is easy to understand their popularity with the plant operators. These operators speak as well of the Simplicity Gyrating Conveyors as they do of the Simplicity Shake-Outs and that is high praise indeed.

We shall be glad to discuss the practicability of a Simplicity Gyrating Conveyor in your foundry. Write us, and a Simplicity Engineer will check your requirements to make proper recommendations.

Installation view showing castings being discharged from a hooded Simplicity Gyrating Conveyor.

Simplicity

ENGINEERING COMPANY · DURAND MICH.

(*Continued from page* 68)

tons was open-market scrap. In the same 4 years, foundry consumption of pig iron was 14,300,196 tons. This consumption of pig iron, according to Mr. Barringer, was 186,491 tons in excess of actual production of foundry and malleable iron during that period.

On the basis of the cast grades comprising 10 per cent of all exports, 1,113,620 tons of cast scrap left the country in 1935-38. This was 4 per cent of the total domestic consumption of cast grades in the 4-year period. Meanwhile, exports of all grades of pig iron totaled 1,224,710 tons, or 8 per cent of the pig iron requirements of foundries in the same period.

"Scrap dealers prefer being merchants to speculators," said Mr. Barringer. "As cast scrap comes on the market and is not absorbed directly in consumption, the dealer must take it off the market and thereby become an involuntary speculator. Foundries would benefit measurably by closer co-operation with scrap dealers, advising them in advance of requirements and enabling them to cover steadily, thereby eliminating the peaks which build up."—*R. L. Hartford.*

Central New York

REGULAR meeting of the Central New York Chapter of A.F.A. was held Dec. 8 at the Onondaga hotel, Syracuse, N. Y. H. H. Judson, Goulds Pumps Inc., and chairman of the chapter, presided.

Frederick G. Sefing, International Nickel Co., New York, presented a third of a series of lectures on "The Metallurgy of Cast Iron." The subject of the particular lecture was, "The Effect of Alloying Elements on Cast Iron." Eighty central New York foundrymen attended the meeting.

The January meeting of the chapter will be held on Jan. 12 at the Onondaga hotel. Mr. Sefing will conclude his series with a talk on, "The Foundry Factors Affecting Cast Iron." The lecture will deal primarily with the condition of the molten metal and cooling rate.—*L. D. Wright, secretary.*

Reading

PRINCIPAL speaker at the November meeting of the Reading Foundrymen's association, held at the Wyomissing club, Reading, Pa., was H. W. Dietert, Harry W. Dietert Co., Detroit, nationally known authority on sand and the use of sand in the making of castings. The subject of Mr. Dietert's talk was, "The Sand in Your Foundry," which was illustrated with lantern slides. There was a question and answer period following the regular session.

Over 70 foundrymen, from Berks county and neighboring counties, were in attendance. The following officers were elected for the coming year: President, E. J. Snell, Keystone Foundry Co., Lebanon, Pa.; vice president, H. P. Good, Textile Machine Works, Wyomissing, Pa.; treasurer, G. W. Shomo, Confer, Smith & Co. Inc., Hamburg, Pa.; executive committee, J. B. Greenstreet, Textile Machine Works, Wyomissing, Pa., G. R. Young, Empire Steel Castings, Inc., Temple, Pa., B. W. Edris, Berks Foundry & Mfg. Co. Inc., West Hamburg, Pa., W. M. Davies, Reading Foundry & Supply Co., Reading, Pa., C. H. Meminger, Lancaster Iron Works Inc., Lancaster, Pa., H. F. Scatchard, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.

The retiring president, Julian B. Greenstreet, who has been president of the Reading Foundrymen's asso-

(*Continued on page* 73)

More interested participants at the recent Chicago conference meeting. Photographs courtesy E. F. Weichmann, Whiting Corp., Harvey, Ill.

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COAL COKE GAS OR OIL FUEL

● No matter what your location, at least one of the approved fuel sources for crucible melting is quickly accessible—COAL, COKE, GAS or OIL. No need to make expensive installations to accommodate any particular type of fuel—*let the fuel accommodate you!*

Foundrymen appreciate too the fact that today's improved crucibles are available in sizes to meet any melting requirement—from size No. 50 producing 150 lbs. brass or bronze to size No. 400 producing 1200 lbs. per heat.

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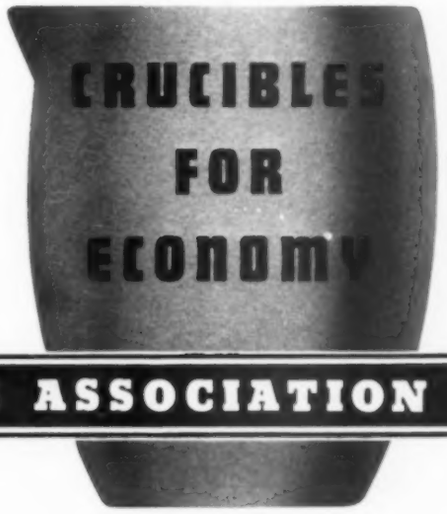

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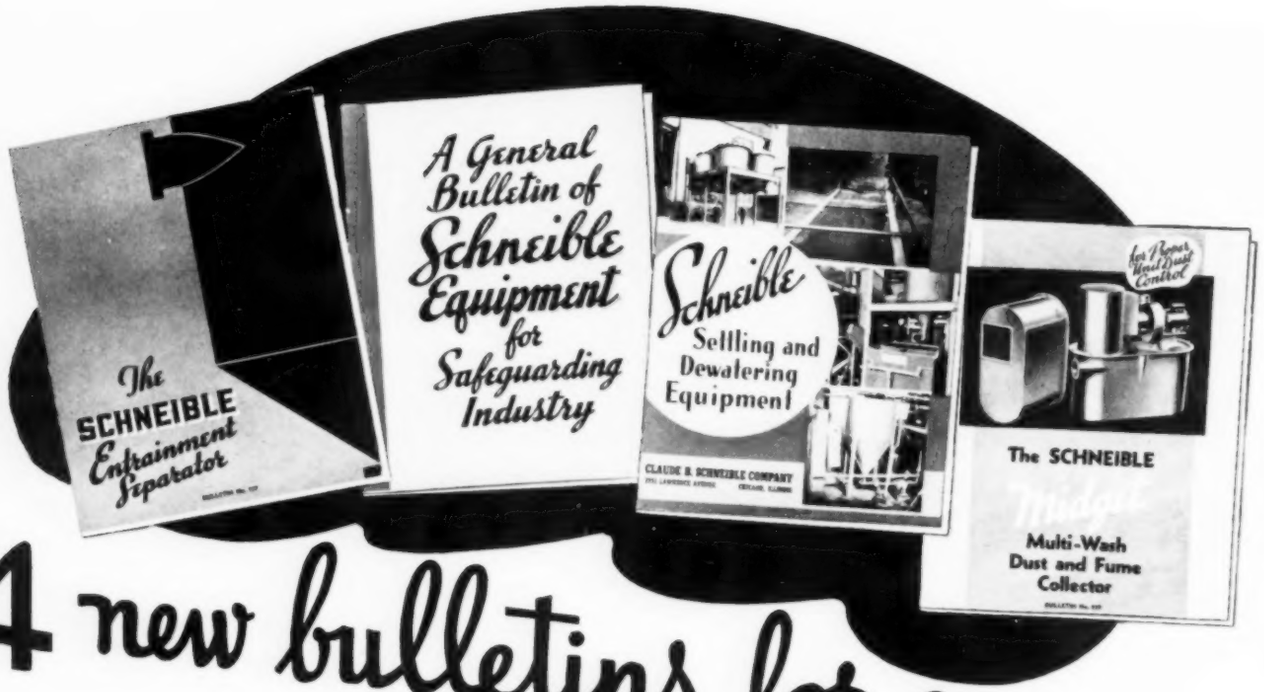
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SCHNEIBLE

(*Continued from page 70*)

ciation since its inception, was lauded by several speakers from the floor, who attributed the successful growth of the association to his untiring efforts.

Guests at the meeting were W. C. Hartmann, Bethlehem Steel Co. and chairman of the Metropolitan Philadelphia Chapter of the A. F. A., W. B. Coleman, W. B. Coleman &

E. J. Snell
President at Reading

Co., and secretary of the Philadelphia chapter; and Harold Henszey, Carborundum Co., past chairman of the Philadelphia chapter.—*H. C. Cummings, secretary.*

Quad City

APPROXIMATELY 85 members and guests were present at the Nov. 20 meeting of the Quad-City Chapter of the A. F. A., held at the Fort Armstrong hotel, Rock Island, Ill. Dr. Harry C. McKown, Gilson, Ill., presented the coffee talk on "Who Ever Heard of Such a Thing." He discussed inventions of early days which were considered rather foolish and showed how many of these ideas have become important.

Principal speaker of the evening, M. A. Scott, Greenlee Foundry Co., Chicago, was introduced by A. E. Hageboeck, Frank Foundries Corp., Moline. Mr. Scott's topic was, "Production of Uniform Dense Structures in High-Test and Iron Alloy Castings." He gave some interesting and important facts regarding gates and risers on castings where shrinks became a problem in making sound castings. Using slides, the speaker showed many examples of the types of gates and risers which could be used for various types of castings to be made.

With considerable testing and investigation in making uniform dense castings, it has been made possible to have molders follow instructions definitely outlined in advance and produce good alloy castings of high tensile strength. Charts were shown giving heat temperatures in various places in the mold and at intervals after the metal had been poured into the mold. These tests were made to determine the possible reactions of the molten metal at danger points that might cause poor castings.

December meeting of the Quad-City chapter was held at the Blackhawk hotel, Davenport, Iowa, on Dec. 11. Herman Alex, chapter chairman, presided at the session at which 90 were present. Speaker at the coffee talk was Lieut. William Hennely, Davenport police department, who gave an interesting and informative talk on the subject of fingerprinting, describing the work already accomplished and the methods employed in taking fingerprints, recording and classifying them.

Main speaker of the session was S. C. Massari, metallurgist, Association of Manufacturers of Chilled Car Wheels, Chicago, who was introduced by Hyman Bornstein. Mr. Massari discussed the graphitizing behavior of iron, based upon observations made in the manufacture of car wheels. Through those observations, many vital factors have been determined relative to control of combustion in the cupola, behavior of iron in various melts, heat treatment, or annealing of that type of casting. He stated that it has been possible to determine definite pouring temperatures, and that proper heat treatment resulted in improvement in the structural characteristics of the various zones in car wheel castings so that they withstood better the rigid tests given during inspection.

Next meeting of the chapter will be held on Jan. 17 at the LeClaire hotel, Moline, Ill. Speaker will be Dr. J. A. Riddenhof, director of research, Frederic B. Stevens Inc., Detroit. His topic will be, "Foundry Facings."—*J. Morgan Johnson, secretary-treasurer.*

New Jersey

OVER 90 foundrymen attended the regular meeting of the New Jersey Foundrymen's association held Nov. 13 at the Downtown club, Newark, N. J., and heard an interesting, illustrated talk by E. L. Bartholomew, chief engineer, United Shoe Machinery Corp., Beverly, Mass., on "Heat Treatment of Cast Iron." Mr. Bartholomew described a new process for surface hardening which he has developed and which he calls interrupted quench. Excellent results against high pressure wear are claimed for irons subjected to the process. Best results have been secured with iron containing 1.75 per cent silicon and 0.50 per cent molybdenum or 1.30 per cent silicon and 2 per cent nickel, but a plain 2 per cent silicon iron also has given good results. Remaining elements are total carbon 3.25 to 3.35 per cent, sulphur 0.100 to 0.130 per cent, manganese 0.50 to 0.80 per cent, and phosphorus under 0.17 per cent.

The process consists in heating the castings to 1550 degrees Fahr., and then quenching in a hot salt or lead bath maintained at 550 degrees Fahr. for 15 minutes. The castings

Julian B. Greenstreet
Retiring President at Reading

then are cooled in any convenient manner; in air, in asbestos, or in an oil bath. After interrupted quench, structure is composed of austenite and acicular troostite or bainite, and the austenite does not break down at room temperature, but is retained for indefinite periods. Under cold working such as a wearing-in period, austenite gradually breaks down into martensite, and that combined with the bainite which remains stable, seems to have excellent wearing qualities. In a comparative test of cast iron cams, the interrupted quench material showed no apparent wear after 105 hours against a relatively short life for the other types of cast iron which were used in the test.

Election of officers for the ensuing year was announced and included the following: President G. W. Hannay, Barnett Foundry & Machine Co.; Vice President J. C. Whelan, Benj. Eastwood Co.; Treasurer J. A. Williamson, Isbell Porter Co.; and Secretary John L. Carter. New directors are: A. P. Grimm, Grimm Foundry Co.; A. N. Kelly, R. Hoe & Co.; W. P. Laytham, Wm. P. Laytham & Sons Co.; R. E. Moore, Flockhart Foundry Co.; H. R. Reitinger, U. S. Cast Iron Pipe & Foundry Co.; P. R. VanDuyne, Meeker Foundry Co., and W. H. Winters, American Brake Shoe & Foundry Co.—*J. L. Carter, secretary.*

With demands for quality castings becoming increasingly rigid, proper sand conditioning and con-

trol is essential, L. B. Knight Jr., vice president, National Engineering Co., Chicago, told members of the New Jersey Foundrymen's association at the Downtown club, Newark, N. J., Monday evening, Dec. 11.

The talk was presented at a joint meeting of the ferrous and nonferrous divisions of the association, with approximately 130 present, and with G. W. Hannay presiding as president.

Proper handling and conditioning equipment, Mr. Knight said, provides means for controlling permeability, bond strength, moisture and inert fines, the most important variables in the sand. Discussing these variables, he said, permeability should be sufficiently high to allow for the free passage of gases when the metal is poured. The allowable limits of permeability for a given class of castings must be determined empirically and the sand controlled within that range. An excess of bond or moisture or both, causes the majority of sand defects, the speaker believes, adding that it is extremely essential that bond and moisture be uniformly distributed in the sand to obtain good results.

Savings made available through proper sand conditioning and control are reflected, Mr. Knight stated, in new sand consumption, cost of disposal of refuse sand, bond consumption, cleaning cost, scrap losses due to sand defects, surface and quality of castings and labor costs.

Importance of close supervision of sand control operations was stressed in the ensuing general discussion. One speaker said that control of equipment should always be in the hands of a practical man. Otherwise, he added, much of the effectiveness of mechanical conditioning and control is lost. It also was deemed important that sand control should apply to core sand and that all incoming sand should be carefully inspected.—*B. K. Price.*

Conn. Nonferrous

SUBJECT of the November meeting of the Connecticut Nonferrous Foundrymen's association was, "Eastern Foundry Sands from the Producers' Angle," and the speaker was A. Y. Gregory, Whitehead Bros. Co., New York. The meeting was held Nov. 15 at the Chase Country club, Waterbury, Conn., with H. A. Phelps, president of the association presiding.

Mr. Gregory pointed out the proximity of the better grades of sands to the Eastern foundrymen. He described how the producers were working to improve the product and to distribute it. He told of the obstacles producers have had to overcome to provide a uniform product since sand is a product of Mother Nature.

A nominating committee consisting of John Wasserlein, chairman, Louis Bentz, Fred B. Clarke, Charles Knapp, and S. W. Chappell was appointed to submit a slate of officers for 1940 to be elected at the December meeting.

October meeting of the association was held Oct. 18, Hotel Garde, New Haven, Conn. H. A. Phelps, president of the association, presided. Principal speaker was E. H. Ewertz, consulting engineer, Groton, Conn., who told of the "History of Submarines." Mr. Ewertz is a pioneer designer of submarines, and has been connected with the industry for more than a half century. He covered the topic of construction from 1642 to the present time and showed pictures of the oldest submarine built in 1642 by Holland, and 1775 by Bushnell, and by Robert Fulton in 1801. He described the old methods of man-power propelled submarines to the modern undersea craft. Mr. Ewertz described the German submarine DEUTSCHLAND of World war fame and of later English submarines.

Central Indiana

EIGHTEENTH chapter of the American Foundrymen's association was organized Dec. 4 at a meeting held at the Columbia club, Indianapolis. The new chapter will include the territory of central Indiana, and the name, "Central Indiana Chapter" has been adopted tentatively. Some 125 members and guests attended the meeting, representing Marion, Anderson, Columbus, Evansville, Kokomo, Munsey, New Castle, Richmond, Terre Haute, and Indianapolis foundries.

I. R. Wagner, vice president, Electric Steel Castings Co., opened the meeting as temporary chairman. He presented Robert E. Kennedy, secretary of the association, who explained that the meeting had been called on the petition of a number of members. He stated that following the usual procedure, a nominating committee had been appointed to present for approval a slate of officers and directors. Those nominated and unanimously elected were: Chairman, I. R. Wagner, vice president, Electric Steel Castings Co., Indianapolis; vice chairman, B. E. Gavin, plant engineer, National Mal leable & Steel Castings Co., Indianapolis; treasurer, J. P. Lentz, foundry metallurgist, International Harvester Co., Indianapolis; secretary, R. A. Thompson, Electric Steel Castings Co., Indianapolis; directors: R. L. McIlvaine, sales manager, Swayne-Robinson Co., Richmond; E. G. Schmidt Jr., International Harvester Co., Indianapolis; B. P. Mulcahy, research engineer, Citizens Gas & Coke Utility, Indianapolis; L. M. McAnly, general superintendent, Rockwood Mfg. Co., Indianapolis; M. B. Falvey, manager, Hoosier Iron Works, Kokomo; L. E. Davis, Republic Coal & Coke Co., Terre Haute; S. A. Norrick, plant manager, Perfect Circle Co., New Castle; S. C. Wasson, manager, National Malleable & Steel Casting Co., Indianapolis; H. B. Harvey, president, Indiana Foundry Corp., Muncie; C. M. Hardy, Houghland & Hardy Inc., Evansville.

Following the election, the new officers and directors were introduced and the meeting turned over to Mr. Wagner as official chairman of the chapter.

Mr. Wagner then introduced as the speaker of the evening W. R. Jennings, foundry superintendent, John Deere Tractor Co., Waterloo, Iowa. Mr. Jennings' talk on foundry molding production methods was exceedingly enlightening, pointing out that while the casting art was of ancient origin, yet technically controlled quantity production was quite new.

Buffalo

REGULAR meeting of the Buffalo Chapter of the A. F. A., was held Dec. 8, with approximately 85 in attendance. Harold J. Roast, vice president, Canadian Bronze Co., Ltd., Montreal, and chairman of the nonferrous division of the A. F. A., presented an interesting talk on "Honesty in the Foundry Business." Following this, Mr. Roast discussed the factors which must be taken into consideration producing castings of silicon bronze. Charles W. Schlesinger, who recently made a study of Russia and Communism, presented the coffee talk on "What's in a Name?"

The annual big stag party of the chapter will be held on Jan. 12 at the Buffalo Catering Co. The committee in charge promises a night of entertainment that will be different. —*J. R. Wark, secretary.*

Philadelphia

REGULAR meeting of the chapter was held Nov. 10 at the Engineers' club, Philadelphia, with approximately 175 members and guests present. W. C. Hartman, Bethlehem Steel Co., and chairman of the chapter was out of the city and in his absence R. J. Keeley, Ajax Metal Co., presided. "Capt." Dwight Long thrilled his audience with colored motion pictures as he told of his accomplishment of sailing 35,000 miles and three-quarters the distance around the globe from Seattle, Wash., to New York harbor, in 4

(*Continued on page* 76)

NORTON SERVICE
1800 CONSULTANTS
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THESE experienced representatives of Norton distributors work out of 150 cities.
Backed by a competent Norton field staff operating from over 25 industrial centers.
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years in a 32-foot ketch.

Principal speaker of the evening was Donald J. Reese, International Nickel Co., New York, who discussed, "Cupola Practice." Mr. Reese prefaced his talk with the statement that foundrymen are faced with the immediate possibility of being required to step up the quality levels of their cast irons and that the decreasing availability of suitable grades of steel and cast iron scrap at present prices, make it imperative that they study the importance of the cupola melting unit to keep costs within reason and successfully meet specifications on higher quality.

One of the annual affairs of the Metropolitan Philadelphia Chapter of the A. F. A. is to welcome the president of the national association at a special meeting of the chapter, without the customary technical discussions. Two hundred and fifty-six members and friends attended National President's night Nov. 27 at the Engineers' club to honor Henry S. Washburn, president of the A. F. A.

Mr. Washburn made a short address and urged the members to support the national body which now represents 18 chapters throughout the country with a membership of over 3000. Among those present were Marshall Post, former president of the A. F. A.; Donald J. Reese, first chairman of the first chapter, that in Chicago and now chairman of the Metropolitan New York-New Jersey chapter; Sam Tour past director of the A. F. A.; Julian B. Greenstreet, president of the Reading Foundrymen's association; L. G. Tarantino, secretary, Connecticut Nonferrous Foundrymen's association; and Gordon E. Jones, vice chairman of the southern division, National Founders association. Lee Harris acted as toastmaster.

Following dinner, Dr. Michael Dorizas, nationally known traveler and lecturer of the University of Pennsylvania, gave a talk with motion pictures of his tour through Spain, Poland and Germany, this past summer.—*J. T. Fegley, chairman, publicity committee.*

New York-New Jersey

STEEL foundries today produce castings which 20-25 years ago would not even have been attempted because of their apparent impossibility declared speaker K. V. Wheeler, vice-president, American Steel Castings Co., Newark, N. J., in introducing his talk on "Design Factors Affecting Castings" before some 80 members and guests at the Dec. 4 meeting of the Metropolitan N. Y.-N. J. chapter of the A. F. A. held at the Essex House, Newark, N. J. with Chapter Chairman W. E. Day, Jr., Mack Mfg. Co., New Brunswick, N. J., presiding.

Success of today's progressive foundries in coping with the need for intricate and complicated steel castings now in everyday use hinges primarily upon close co-operation between designing engineer and foundryman, said Mr. Wheeler. Consideration of casting principles has made possible elimination of defects and has enabled use of lighter metal sections with attendant reductions in casting weights.

With an interesting series of slides the speaker showed numerous examples of complicated steel castings produced by the careful proportioning of the metal sections involved and by the intelligent use of chills and risers. Production of a typical casting, a multistage pump housing, was traced from the drawing board to the finished product to demonstrate how joint planning by the designing and foundry depart-

(*Continued on page* 78)

Upper left—Marshall Post, Henry Washburn and W. C. Hartman. Upper right—Reading right to left, W. C. Hartman, H. Reitinger, L. W. Harris, Dr. M. M. Dorizas, and Henry Washburn. Two lower views show a few of those attending the President's night dinner of the Philadelphia chapter. Photos courtesy of William B. Coleman, W. B. Coleman Co.

PS* FOR 1940...

*Profit Strategy becomes an essential factor in sales and production plans for 1940.

Those foundry operations using Herman molding equipment will produce quality castings at minimum cost and high speed, enabling their sales organization to overcome competition by being able to offer quicker deliveries and lower costs.

Hermans produce better molds 3 to 4 times faster than old methods and at a fraction of the cost. The savings in time, labor and power is naturally reflected in sales and profits statements.

Get the full story on Herman molding equipment. Any molding job can be produced on one of the many types of Herman molding machines. Call in a Herman engineer to help you plan your Profit Strategy for 1940.

MOLDING HERMAN MACHINES

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.

ADVERTISING PAGES REMOVED

(*Continued from page* 76)

ments produced a casting which could be properly poured and fed. Mr. Wheeler recommended use of generous fillets wherever possible to eliminate stress concentrations. He suggested that pouring temperatures, especially those for alloy steels, need be controlled carefully to secure the best results.

A discussion skillfully guided by technical chairman L. A. Klever, Taylor Wharton Iron & Steel Co., and centering upon welding of castings and use of radiography in detecting defects followed the well received talk. Preceding Mr. Wheeler's talk an instructive film entitled "The Story of the Chilled Car Wheel" was presented by the American Association of Chilled Car Wheel Manufacturers.

Speaker for the Jan. 2 meeting will be Sam Tour, vice president, Lucius Pitkin, Inc., New York, whose subject will be "Brass, Bronze and Aluminum Castings." A film showing the manufacture of brass and bronze ingots will be shown.—*K. A. De Longe assistant secretary*

Wisconsin

APPROXIMATELY 125 members and guests of the Wisconsin Chapter of A.F.A. attended the Nov. 17 meeting held at the Schroeder hotel, Milwaukee. The meeting was divided into four discussion groups with the following leaders: Gray iron, Martin J. Lefler, Western Foundry Co., Chicago; Malleable, F. C. Scheiber, Whiting Corp., Harvey, Ill.; Nonferrous, Don May, Crane Co., Chicago, and Steel, Harvey Payne, W. Harvey Payne Co., Chicago.

Mr. Lefler discussed gray iron melting and described the various steps in cupola melting beginning with chipping out the cupola after the previous heat, and then following with putting in the bottom, the coke bed, charging, and melting. He believes that the coke size should be about one-twelfth the diameter of the cupola.

Mr. Scheiber described various melting methods employed in the malleable industry, and devoted considerable time to giving information on the air furnace-cupola duplexing method. Following his talk, he led a discussion on various points, and amplified the information given. Points discussed and given particular attention were physical properties of duplexed metal, change in melting technique required when changing coals.

Mr. May spoke on brass melting furnaces, and said that in gas furnaces air and gas should be equal, and oxygen content in the furnace atmosphere should not be over 0.2 per cent. Some alloys are gased easily, and fluorspar or glass should be used as a cover. Indirect-arc,

(*Concluded on page* 81)

Nearly 700 attended annual party of Northeastern Ohio chapter Dec. 14. Photographs courtesy Sterling Farmer, Sand Products Corp., Cleveland

(*Concluded from page* 78)

rotating furnace gives excellent results with costs ranging from $3 to $6 per ton melted. Shrinks in castings may be caused by high pouring temperature since 25 to 35 degrees above proper temperature is too much. Borings to the extent of 10 to 15 per cent can be used, but they must be dry and free from oil to avoid trouble.

Mr. Payne's discussion on steel took the form of a roundtable, and a variety of phases were considered. Loss in manganese in production of intermediate manganese steel was discussed with factors in melting practice most likely to result in recovery. Influence of melting practice on physical properties was described and led to the matter of deoxidation and deoxidizers, etc.

Foundrymen To Meet At Del Monte

Program for the 2-day technical meeting to be held under the sponsorship of the Northern California Chapter and the Southern California Chapter of the A.F.A. during the 16th annual meeting of the iron and steel and allied industries at the Hotel Del Monte, Del Monte, Calif., Feb. 8, 9, and 10, recently has been announced. Considerable interest among the foundries of California has been evident, and every indication points to a record attendance.

The following is a tentative program:

THURSDAY Feb. 8

9:30 a. m.—Government Is Made for Man—Not Man for Government, by James F. Lincoln, Lincoln Electric Co., Cleveland.

Outlook for the Steel Industry, by Benjamin J. Fairless, president, United States Steel Corp., Pittsburgh.

Planning for Tomorrow, by Henry S. Washburn, president, Plainville Casting Co., Plainville, Conn., and president, American Foundrymen's association.

Meeting California Problems, by James Mussatti, general manager, California State chamber of commerce.

2:00 p. m.—Objectives of the American Foundrymen's Association, by Henry S. Washburn.

Hygiene in the Foundry, by Donald E. Cummings, director, division of industrial hygiene, University of Colorado, Boulder, Colo.

Cupola Operations, by Donald J. Reese, director, Development and Research division, International Nickel Co., New York.

Nonferrous Operations, speaker being selected.

7:00 p. m.—Informal foundry dinner meeting.

9:00 p. m.—Motion pictures on foundry and steel industry.

FRIDAY, Feb. 9

Iron and Steel Clinic

9:30 a. m.—Relationship Existing between Industry and the Government, by W. C. Mullendore, executive vice president, Southern California Edison Co., Ltd., Los Angeles; vice president and director of the Chamber of Commerce of the United States, and chairman, industrial committee, director, California State chamber of commerce.

Industrial Co-operation with the United States Army To Build Up Our Own Defense, by Col. W. Goff Caples, Corps of Engineers, Presidio, San Francisco.

2:00 p. m.—Activities of the American Foundrymen's Association, by C. E. Hoyt, executive vice president, American Foundrymen's association, Chicago.

Use of Castings in Ship Construction, by J. D. Fenstermacher, Columbia Steel Co., San Francisco.

Meeting the Market Needs of Metals, by J. P. Gill, president, Vanadium Alloy Steel Co., Latrobe, Pa., and president, American Society for Metals.

Foundry Equipment, speaker being selected.

General Conference Program

2:00 p. m.—Procedures under the Wagner Labor Relations Act and Their Relationship to Industry, by Paul Watkins, Lathem, Watkins & Bouchard, Los Angeles.

Changes in the Unemployment Insurance Act and the Effects of California Industry, by Ansley K. Salz, A. K. Salz Co., San Francisco, and member, California Unemployment Insurance commission.

Lecture Course for Chicago Chapter

Chicago chapter of the AFA has announced its 1940 lecture course, offered primarily for operating foundrymen, apprentices and students desirous of broadening their knowledge of general foundry problems.

Lectures are scheduled for selected Monday evenings, which do not conflict with regular chapter meetings, and will be held in Peoples Gas building auditorium, 122 South Michigan avenue, starting promptly at 7:15 p. m. Cost for the complete course of 12 lectures is $1.00 for members and $2.00 for non-members, with a charge of fifty cents per lecture for those not enrolled.

Of the 12 lectures six will be on steel castings delivered by Prof. L. J. Haga, Lewis institute. The steel lectures will be as follows: Jan. 22, "Cast Steel as an Engineering Material;" Feb. 5, "Raw Materials for Steel Castings;" Feb. 26, "Open Hearth and Converter Practices of Melting Steel;" March 18, "Electric Furnace Practice of Melting Steel;" April 1, "Annealing, Normalizing, Hardening and Tempering Steel Castings;" April 22, "Heat Treatment of Alloy Steel Castings."

Gray iron lectures will be as follows: Jan. 15, "Cupola Practice and Elementary Metallurgy of Cast Iron," R. A. Clark, Lakey Foundry & Machine Co., Muskegon, Mich.; Jan. 29, "Melting and Annealing Malleable Iron," W. R. Bean, Whiting Corp., Harvey, Ill.; Feb. 19, "Cast Iron Alloys," Herman Aufderhaar, Electro Metallugical Co., Chicago; March 4, "Rigging and Equipment," speaker to be announced later; March 25, "Facings and Facing Sands," J. A. Ridderhof, Frederick B. Stevens Co., Chicago; April 15, "Cores and Core Oil," J. A. Gitzen, Delta Oil Products Co., Chicago.

Census to Collect Foundry Data

By A. W. von Struve
Department of Commerce

What have been the developments in the foundry industry during the last 2 years? Will the tonnage for 1939 equal or exceed that for 1937? What industries have increased their buying of foundry products? Is each plant getting its share of the business to which it is entitled?

Answers to these and many other questions of interest will be given in data to be gathered through the census of manufactures and business which starts in January as part of the sixteenth decennial census.

Figures for 1939 will be collected on tonnage, value and sales of castings and rolls; employment and payrolls; and consumption of pig iron, and iron and steel scrap. Production and sales officials will find this data valuable as a yardstick to measure performance of their plants.

Value of a company's products, for example, may be compared with the average for the industry. In 1937 this value per establishment averaged $322,278. Total value for the industry that year was over $397,300,000—an increase of more than 58 per cent over 1935, and 178 per cent over the value in 1933.

In appraising expansion and replacement trends, foundry operators can make good use of the figures on expenditures for new equipment, plants and land, which will be collected in the 1940 census. Data will also be compiled, for the first time since 1929, on power equipment being used, as well as on expenditures for fuel and electric energy. Of special interest to the sales and marketing staff in gaging their market, will be the figures on the cost of materials and supplies.

All individual information revealed in answers to the questions asked by census takers will be kept confidential. This protection to those questioned is written into the law. No one, in or out of the government, other than sworn employes of the census bureau, will see the answers, except in broad statistical form.

Since timeliness of the information is all-important to business, the census bureau is planning every effort to speed its compilation and tabulation. On Jan. 2, 12,000 census enumerators will be in the field collecting data on manufactures, business, mines and quarries. In April, a force of 120,000 field workers will start work collecting the information for other census reports.

MUSEUM HAS OPERATING FOUNDRY EXHIBIT

(*Continued from page* 33)

to these is a panel of centrifugal castings, followed by an elaborate 7 by 8-foot map showing the country's foundry centers and their production of various castings.

The working exhibit proper, shows a sand testing laboratory and a core department with blower, mixer and oven. It is planned to produce small souvenir castings in the model foundry. When the exhibit was dedicated at the regional conference of the Chicago chapter, American Foundrymen's association, Nov. 9 to 11, a cone-shaped casting used to form a Christmas tree stand was produced.

Many Supply Exhibits

Equipment includes two molding machines, numerous roller conveyors, overhead monorail system, cupola, electric furnace, shakeout machine, sand muller, sand handler, blasting equipment, ventilating equipment, and grinder.

Patrons who made the exhibit possible include: American Optical Co., Southbridge, Mass.; Allen-Bradley Co., Milwaukee; Allis-Chalmers Mfg. Co., West Allis, Wis.; American Air Filter Co., Louisville, Ky.; American Foundry Equipment Co., Mishawaka, Ind.; American Foundrymen's association, Chicago; American Steel Foundries, Chicago; Arcade Mfg. Co., Freeport, Ill.; Association of Manufacturers of Chilled Car Wheels, Chicago; Benjamin Electric Mfg. Co., Chicago; Burnside Steel Foundry Co., Chicago; Carborundum Co., Niagara Falls, N. Y.; Cast Iron Pipe Research association, Chicago; Chicago chapter, American Foundrymen's association, Chicago; Cleveland Crane & Engineering Co., Cleveland Tramrail division, Wickliffe, O.; Crane Co., Chicago; Joseph Dixon Crucible Co., Jersey City, N. J.; Harry W. Dietert Co., Detroit; Fairbanks-Morse & Co., Chicago; Foundry Equipment Co., Cleveland; Ford Motor Co., Detroit; General Bronze Corp., Long Island City, N. Y.; General Electric Co., Schenectady, N. Y.; General Refractories Co., Philadelphia; Gray Iron Founders' Society, Cleveland; Harbison-Walker Refractories Co., Pittsburgh; Hines Flask Co., Cleveland; Ingersoll Rand Co., New York; International Molding Machine Co., Chicago; Interlake Iron Corp., Chicago; Johnston Mfg. Co., Minneapolis; W. A. Jones Foundry & Machine Co., Chicago; Kirk & Blum Mfg. Co., Cincinnati; William F. Klemp Co., Chicago; Link-Belt Co., Chicago; Malleable Founders' Society, Cleveland; Mathews Conveyer Co., Ellwood City, Pa.; Mine Safety Appliances Co., Pittsburgh; National Carbon Co., Cleveland; National Engineering Co., Chicago; S. Obermayer Co., Chicago; Osborn Mfg. Co., Cleveland; Ohio Ferro-Alloys Corp., Canton, O; Pickands-Mather & Co., Cleveland; Pennsylvania Transformer Co., Pittsburgh; Pittsburgh Electromelt Furnace Corp., Pittsburgh; Rockbestos Products Corp., New Haven, Conn.; Shephard-Niles Crane & Hoist Corp., Montour Falls, N. Y.; Eugene W. Smith Inc., Evansville, Ind.; Werner G. Smith Co., Cleveland; Standard Sand & Machine Co., Chicago; Star Electric Mfg. Co., Bloomfield, N. J.; Steel Founders' Society of America, Cleveland; U. S. Electrical Tool Co., Cincinnati; U. S. Hoffman Machinery Corp., New York; White Pine Lumber Co., Chicago; and Whiting Corp., Chicago.

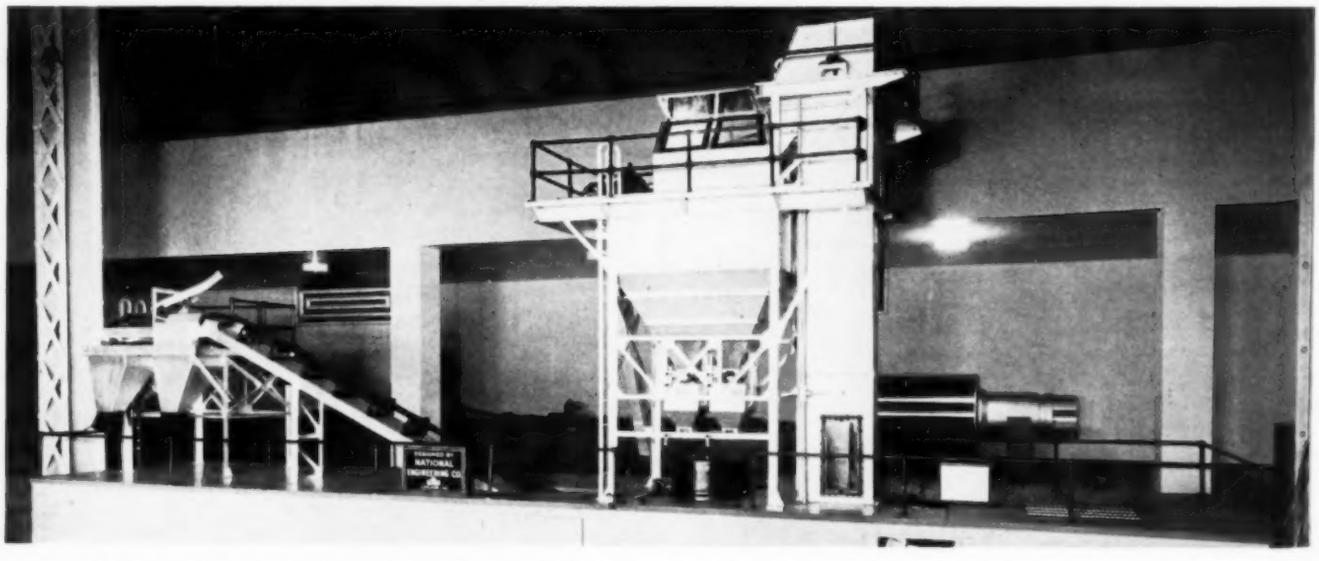
A. C. Carlton and L. C. Fopeano of the Museum of Science and Industry, both members of the Chicago chapter, American Foundrymen's association are responsible in large part for the exhibit.

Plan Conference at Michigan State

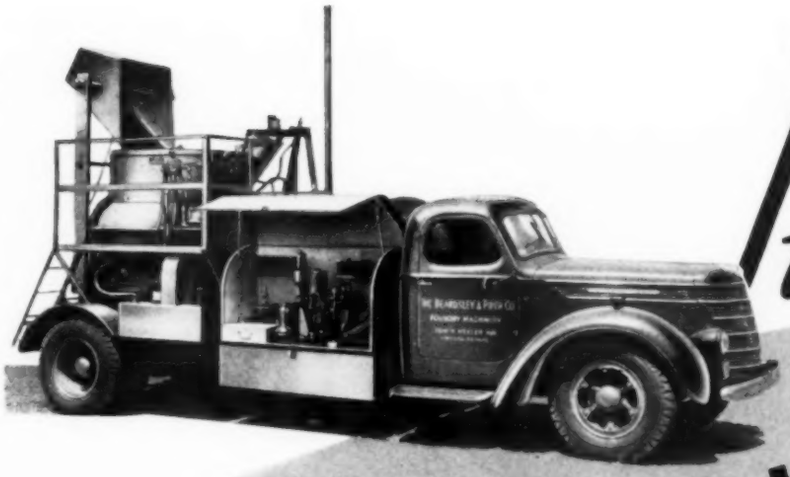
The eighth annual regional foundry conference, sponsored by the Detroit Chapter of the A.F.A., and Michigan State college, will be held at the college, East Lansing, Mich., April 12 and 13. Technical discussions at the conference will be built around the theme, "Melting and Solidification of Foundry Metals."

The program, which is in the process of formation, will include a number of authorities on the various phases of that subject, as it affects both ferrous and nonferrous casting industries. Fred A. Melmoth, Detroit Steel Casting Co., Detroit, is chairman of the committee on arrangements.

Volume No. 33 in the marketing series entitled, "Recent Developments in Packaging Progress," by H. J. Higdon, Phoenix Metal Cap Co.; Harry Carlton, University of Tennessee, and Alan S. Cole, *Modern Packaging*, has been published by the American Management association. Copies may be secured for 50 cents each by addressing the association at 330 West Forty-second street, New York.



Model sand handling and conditioning unit which is displayed on the ground floor of the Hall of Metals



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Speedmullors

Twin Speedmullors **operating in one of America's most important foundries. Economies have been phenomenal.**

We urge you to investigate every claim made for this most sensational mill. Do not accept our statement that it is the fastest, best and most economical method for mulling, backing, facing and core sand. Talk it over with people who use the *Speedmullor* every day; see it in operation; try it before you buy it. We'll ship one to you for thirty days' free trial.

Check *Speedmullor* capacity, quality of mix and cost per ton of sand mulled against the product of any other device, method or system. Thus, you'll find the solution to your mulling problems, and B&P's answer to your need for more scientific mulling at less cost per ton.

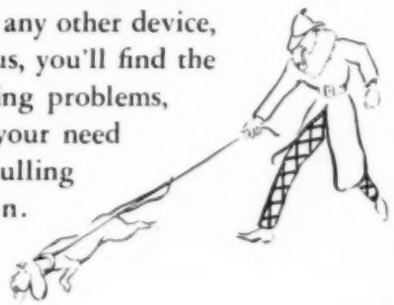


EXHIBIT "A"

A *Speedmullor* user installed his first mill thirteen months ago in a large steel foundry. Since then, this *Speedmullor* has scientifically mulled 56,413,000 pounds of sand. Today, there is no appreciable wear on the rubber-tired mulling elements. When the original tires are worn out, a new set will cost this foundry approximately $20.00. The customer has installed his second *Speedmullor*.

EXHIBIT "B"

Another *Speedmullor* user installed his first mill fourteen months ago. He has now mulled 103,680,000 pounds of sand. On the strength of the large production, low-cost, scientific mulling performance, this foundry now has three *Speedmullors* in daily operation.

EXHIBIT "C"

Another prominent foundry has used one set of B&P rubber mullor tires for eleven years and, in their opinion, confirmed by our careful inspection, the original set of tires should last an additional eleven years. This foundryman says: "If we had been using steel tires, we would have worn out twenty-two sets at approximately $200 per set (a total steel tire cost of $4,400) not to mention the more rapid breakdown of the silica grain sand and costly delays in replacing the steel tires."

Write today for thirty-day FREE TRIAL

The BEARDSLEY & PIPER CO.

2541 NORTH KEELER AVENUE **CHICAGO, ILLINOIS**

NEW FOUNDRY BUILDS TRUCK ENGINES

(*Continued from page* 27)

able floor space is used not only once, but many times each day. In a total floor area of 215,795 square feet in this new foundry, all the molds for a 300-ton heat are made, poured, and shaken out on a floor area of 69,696 square feet. This is 248 square feet of molding floor area per ton. This also can be operated two shifts.

In this connection also it is interesting to note that the core making department covering 73,983 square feet of floor area, is the largest single unit in the combination of departments. Other units of the foundry are the pattern shop of 13,063 square feet, pattern vault 10,164 square feet, locker room 10,164 square feet, cleaning room 34,848 square feet, maintenance department 2508 square feet, and cupola building 9020 square feet. The total length of the main building is 1012 feet. The width varies.

Approximately one-half of the irregular rectangular building is 200 feet wide. This main section houses the core making, molding and cleaning departments. The stock yard parallels the main building for the entire length and extends for a distance of 141 feet toward the property line to the west. The north end of the stock yard is under a roof and contains a row of five large concrete sand bins with a combined capacity of 22,800 tons, or 456 regular 50-ton car loads.

Three Cranes in the Yard

A crane runway extends the entire length of the stock yard and continues over the sand bins and supports three 100-ft. span electric traveling cranes, each of which is equipped with both clam shell bucket and magnet, making this crane equipment interchangeable for unloading either sand or cupola charging materials. A spur from the railroad enters the property on the west and continues under the crane runway extending throughout the length of the stock yard and to the extreme north end alongside the sand bins.

Touching on the general construction features, the new foundry building is a steel skeleton type with columns on 22 x 44-foot centers. The walls are brick and the extensive windows are of heavy corrugated wire glass. The roof is an *M*-type, covered with gypsum slab, composition roof with ventilated skylights on both sides of the *M* the full length of the entire building.

Light conditions on the inside of the building are approximately equal to those on the outside. The floor is a smoothly finished concrete slab in the molding section, and in the core making and cleaning room sections is a concrete slab covered with wood block to the level of the concrete floor in the molding section. Incidentally, in conformity to a general standardization plan, the longitudinal walls of the building extend exactly north and south. The other buildings in the group making up the present plant are laid out on the same lines.

It also is interesting to note that in planning this foundry group, expansion possibilities were considered of paramount importance. The layout is unique in that the co-ordination of departments is perfect, and yet each department is so located and arranged that it can be expanded with no interference to regular production operations. Also, any one individual department might be expanded should such an emergency arise.

Provision Made for Expansion

The same expansion possibility holds true in the stock yard and sand bins. In general, the expansion of the stock yard and melting facilities would be to the south. The expansion of sand storage facilities would be to the north. Expansion of pattern shop, pattern vault, locker room, core making, molding and cleaning departments would be to the east. Even after ultimate expansion, each department or unit of this foundry group will retain its exact relation to all other units as in the initial layout.

Inside the foundry building where individual operating units will be considered in further detail in a later article, mechanical equipment does all the hard, heavy work, and in addition does the work more efficiently and with a greater degree of accuracy and uniformity than is possible where the variable human element is involved.

This is recognized as an important feature in any foundry and particularly in a foundry where vast quantities of duplicate castings are produced day after day. According to several independent investigators who have studied the subject and whose findings have been published from time to time, material to the extent of 60 tons is lifted or moved during the process of producing one ton of gray iron castings.

The predominating feature in this new foundry is probably the natural and easy flow of materials throughout the various phases of manufacture. All core sand, is stored in the storage bins immediately to the west of the core making department. This sand is taken from the storage bins with the clam shell and deposited in a large hopper which feeds through the sand dryer and various mechanical equipment and hoppers to the core sand mixing.

Core sand is distributed from the core sand mixing to the various core making locations. The core makers are so located that they deposit the finished cores on carriers hung on continuous chain traveling through three continuous core ovens. These ovens are of the most modern type equipped with all safety controls and arranged for a wide spread in temperature. Heat is supplied by butane gas burners at one end of the oven. The flame does not enter the oven.

The gas is burned in an outside chamber and the heated air is introduced to the oven through a series of ducts in the wall. Considerable economy is effected by a form of construction and method of operation whereby the heated air in the oven is not exhausted to the atmosphere. It is reintroduced to the heating chamber and kept in circulation.

Some of the first molding machines were installed in plants operated by the Harvester company. In like manner, sand handling equipment and mold conveyors were installed in the various plants from time to time. As a matter of record, it is interesting to note that when Beardsley & Piper, two young Lochinvars, came out of the West with a new-fangled contrivance for ramming sand in molds according to a new and radical method, the International Harvester Co. was the first customer and installed a machine in the McCormick works, Chicago. A description of this installation, the first to appear in any publication, was presented as a feature article in Aug. 15. 1919, issue of THE FOUNDRY.

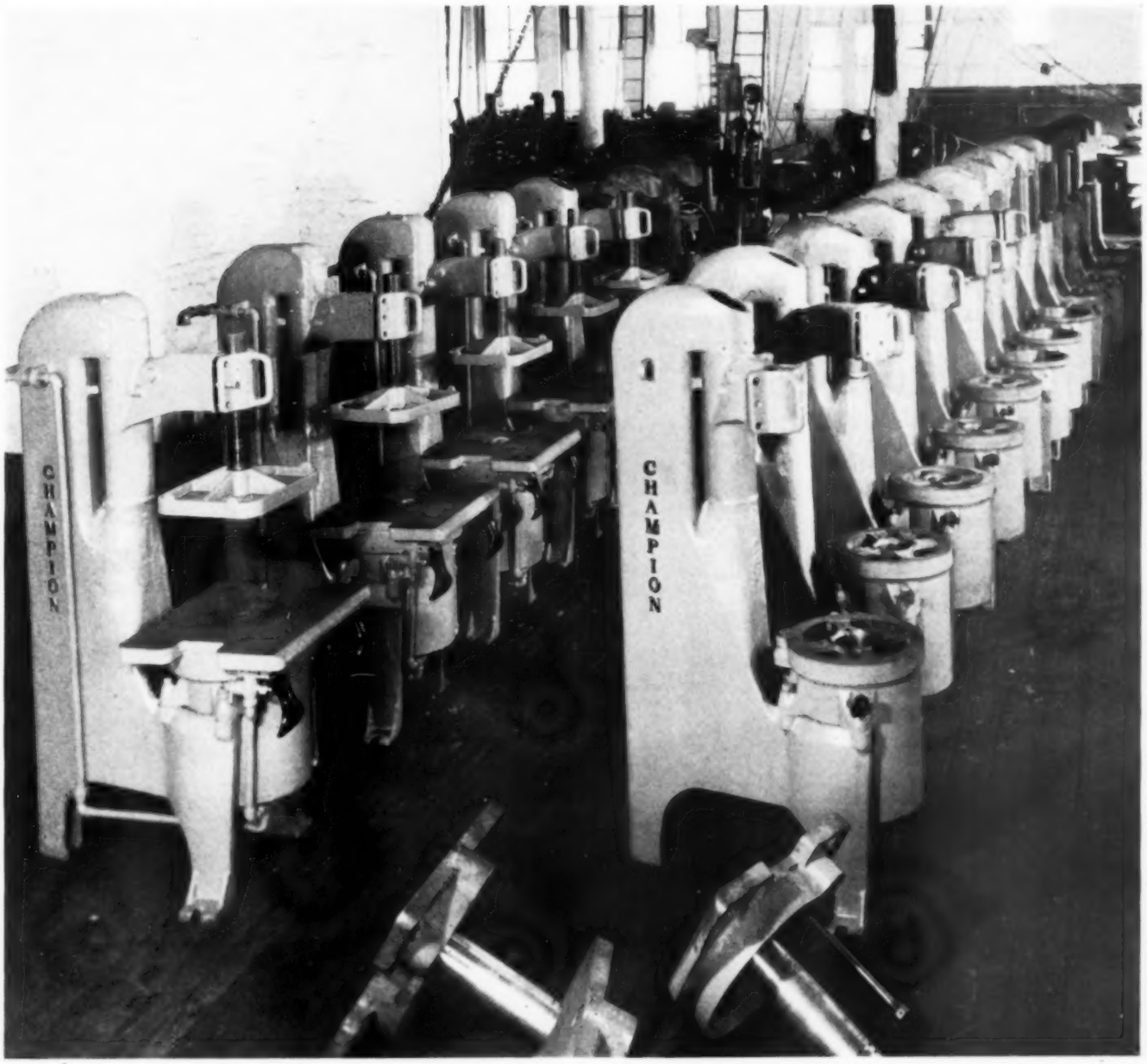
Core Made in Three Sections

A modern type sandslinger, retaining the basic principle of the original, but differing widely in many of the attendant features, occupies a prominent place near the north end of the new Indianapolis foundry core room. It is employed in making the combination crankcase and barrel cores for the cylinder blocks of the truck engines. For convenience in handling, the core for the six-cylinder unit is made in three sections with two barrels in each section.

The sandslinger unit is suspended from an overhead steel frame. Most of the machine is close to the frame. Sand is conducted at high speed to the corebox through a pendent chute. The latest refinement on the device is a hood which fits over the corebox and prevents loose sand

(*Concluded on page* 86)

CHAMPION JOLT SQUEEZERS
IN PROCESS OF ASSEMBLY



Champion Jolt Squeezers are designed and built to the
MACHINE TOOL STANDARD OF TODAY.

Every detail of construction designed for maximum service.
Every detail of operation designed for
TOP-NOTCH PRODUCTION AND EFFICIENCY.

Only the best of materials are used throughout. Cast steel column base and platen arm. Special alloy cylinders and pistons.
HARDENED AND GROUND BEARINGS FOR PLATEN ARM.
Bronze valves. Manufactured in all sizes. Portable or stationary.

Get Complete Details.

Manufactured in Canada by John T. Hepburn Limited, Toronto

CHAMPION FOUNDRY and MACHINE CO.

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(*Concluded from page* 84)

from flying in all directions. Sand is supplied from an overhead hopper. This coremaking unit is equipped with six coreboxes, two adjoining turntables and a tank filled with liquid blacking. Operating crew is made up of six men.

One man operates the sandslinger, the second man prepares the empty boxes, sets the wires in the barrels and shoves the box under the sandslinger spout. The third man buttrams the sand in the open end of the box, scrapes off the superfluous sand and shoves the box on to the second turntable where the fourth man inverts core and box and removes the box from the core. The fifth man reassembles and clamps the two halves of the corebox. The sixth man places a core on the two opposite sides of the blacking tank. The cores sink until the black is about half way up on the barrels. The cores then reappear and the sixth man places them on the nearest rack of a continuous oven.

After cores are baked they move through the various operations of blackening, grinding, pasting and assembly on a series of gravity and power conveyors to the core setting stations on the mold conveyors.

All molding is done on continuous conveyor mold units of various designs to accommodate the different size and style of castings. Dust and fume exhaust systems are complete. Immediately after the cope is lifted, the hot castings are hung on a continuous chain which removes them from the foundry floor and elevates the hot castings to ventilating chambers built into the roof monitor, and then continues through the core knockouts and out over the sand storage bins for cooling before being delivered on this same chain to the cleaning room for the various cleaning operations. All castings from all of the units move through various mechanical contrivances to the cleaning room and thence to the machine shop.

A close inspection of this complete foundry unit will reveal the fact that the International Harvester Co. has progressed further in the protection of employes by means of effective safety devices and exhaust systems than is usually the case. Along with the installation of all of these protective features, they have combined devices to provide for the utmost comfort of the men, such as inducing fresh air at the shakeout units and a sufficient supply of preheated fresh air to make up for all air lost through the exhaust systems.

This is the first article dealing with some of the general features of a foundry recently erected in Indianapolis by the International Harvester Co. A second article covering many of the operating features in detail will be published in an early issue of THE FOUNDRY.

THE EDITORS

OBITUARY

MRS. HARRIET FISHER ANDREW, 72, owner of the Fisher & Norris Eagle Anvil Works, Trenton, N. J., prominent in social and manufacturing circles for many years died Nov. 16 at her home Bella Vista farm. She was married in 1898 to Carl Fisher, grandson of the founder of the anvil works and after he was fatally injured in a train wreck in 1902 she assumed active charge of the business. In 1925 she married S. E. Andrew, a former officer in the navy of Argentina. Thirty odd years ago when roads were in a decidedly embryo condition in many parts of the United States and practically nonexistent in far eastern countries, this indomitable lady had a special automobile built and accompanied by maid and chauffeur made a tour completely round the world. She maintained a villa in Italy for many years, but closed it when political domination became irksome and brought her extensive collection of furniture and art treasures to the family home on the outskirts of Trenton. She was an early and consistent member of the American Foundrymen's association, read a paper at the Atlantic City convention, and was the first woman member of the National Manufacturer's association.

* * *

Elmer E. Britney, 75, secretary-treasurer, Standard Castings of Cincinnati Inc., died recently in that city.

* * *

Mathias F. Cunningham, 66, president of the Waltham Grinding Co., Waltham, Mass., died recently at his home in Waltham.

* * *

Paul E. Schwandt, 66, treasurer, Brookside Brass Foundry & Mfg. Co., Cleveland, until his retirement 2½ years ago, died Nov. 13 in Cleveland.

* * *

Charles E. Attwood, 55, president, Attwood Brass Works, Grand Rapids, Mich., died recently. Mr. Attwood was a past director of the Grand Rapids Metal Trades association.

* * *

William Y. Banks, 54, manager of the steel castings sales division at the Brackenridge plant of the Allegheny Ludlum Steel Corp., died Nov. 23 at his home in Aspinwall, Pa.

* * *

Edmund B. McKenna, 64, president, Standard-North Buffalo Foundries, Inc., Buffalo, died recently in that city. Mr. McKenna organized the Standard Foundry Co. in 1904, and served as president of its successor, Standard-North Buffalo Foundries Inc., which was formed 3 years ago.

* * *

William D. Pierson, 67, secretary and director, Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., died in that city Dec. 2. Mr. Pierson joined the company's engineering staff in 1895.

* * *

William H. Lydamore, 76, former superintendent of the International Harvester Co., Chicago, and of the Moline Plow Works, Poughkeepsie, N. Y., died Nov. 30 in Muskegon, Mich., where he had lived since 1917.

* * *

Chris Zimmerman, 70, vice president, W. S. Tyler Co., Cleveland, before his retirement 3 years ago, died in Cleveland Nov. 29. Mr. Zimmerman has been associated with the company 50 years.

* * *

Reinhard Koepsell, 61, vice president, North End Foundry Co., Milwaukee, died recently. Mr. Koepsell was one of the founders of the firm in 1906, and he continued active in the organization until his death.

* * *

Arthur MacDougall, 66, New York, sales manager for Ajax Metal Co., Philadelphia, died Nov. 21 at his home in Brooklyn, N. Y. Mr. MacDougall joined the Ajax company in 1903 and before then was with Magnolia Metals Corp.

* * *

Clement W. Inglis, 76, former secretary and treasurer, Milwaukee Steel Foundry Co., Milwaukee, died Nov. 24 in that city. Mr. Ingus helped organize the company in 1904 and from 1927 until his retirement in 1937 was connected with the engineering department, Heil Co.

* * *

P. F. Mork, 78, owner of the P. F. Mork Foundry, Beloit, Wis., since 1910, died recently following injuries received in a fall. Prior to the organization of the P. F. Mork Foundry, Mr. Mork operated shops in Chicago, and at one time owned the Central Foundry Co. on the site of the present Northwestern railway depot in Chicago.

* * *

Edward F. Erdman, 73, former supervisor for the Allyne-Ryan Foundry Co., Cleveland, died recently. Mr. Erdman, a veteran of 50 years in the foundry business, entered the field in the 1880's with the old Peckstow-Wilcox Co., Cleveland. He was with that concern until 1899 when he went to the Interstate Foundry Co. He left that company in 1914 to join Allyne-Ryan and remained until 1937 when he retired.

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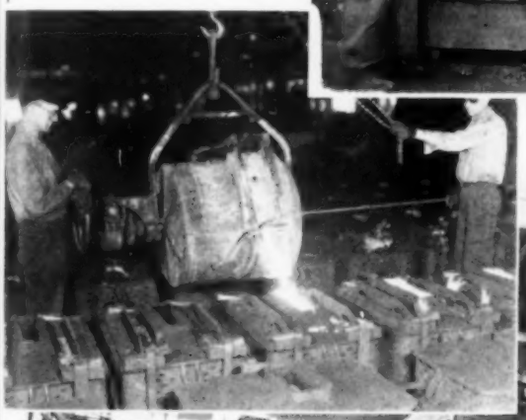

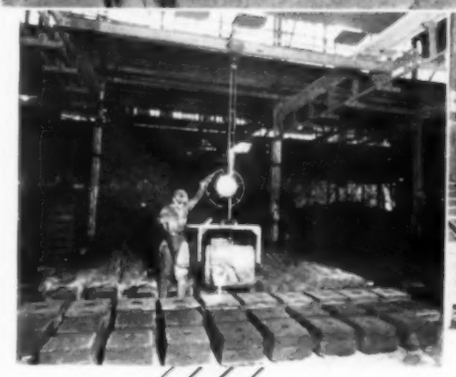

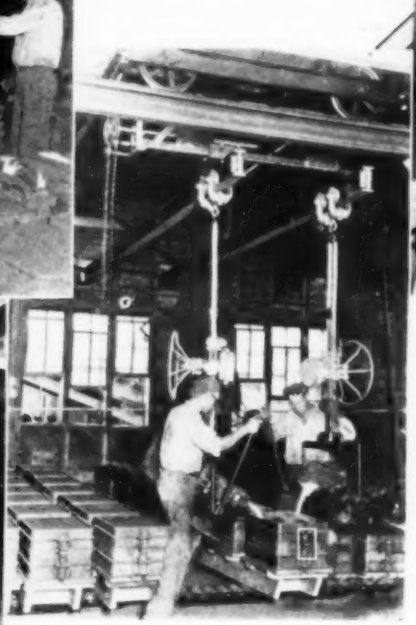

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MODERN EQUIPMENT CO.

AVOID DEFECTS IN NONFERROUS FOUNDRY

(*Continued from page* 35)

develops an excessive amount of surface oxide which must be knitted into the casting and flowed to the surface if a perfect casting is to result. Sometimes such an operation actually occurs and the gating is assumed to be correct. On a later occasion a casting gated in the same manner but with the metal poured a few degrees colder exhibits these scum spots or seams. Some other cause is blamed for the trouble that in reality is caused by badly shaped gate or gates that prevent quiet entrance of the metal into the mold.

Riser Size Important

Proper size of risers with respect to the size of the casting to be fed and proper location and connection to the casting, are important items that may influence materially the production of good or defective castings. Inadequate risers invariably will result in improper feeding and, therefore, internal shrinks. Badly located risers, almost invariably result in internal shrink holes at a point that has not been fed because metal from the risers could not reach it. Risers so shaped that they lose their heat rapidly and freeze before the casting, frequently demand feeding that will draw metal from the casting and produce a shrink hole at the junction of the riser and the casting, or adjacent thereto.

A round riser is much to be preferred to a square or rectangular riser. The surface area of a square riser is much larger in proportion to the volume enclosed than the surface area of a round riser. Increase in surface area increases heat radiation resulting in a more rapid drop in temperature of the square riser as compared with the round riser containing a similar volume of metal.

Since it is desired that the riser shall remain fluid at least as long, and preferably much longer than the casting itself, anything that tends to increase the heat radiation or heat lost from the riser is a step in the wrong direction. Shrink holes, defects due to misplaced risers or inadequate risers, may arise from a properly located and properly sized riser of the wrong shape, which causes the riser to cool too rapidly.

Any discussion of defects arising from gating would not be complete without mention of defects produced by the use of misshapen or badly constructed sprues or entrances through which the metal enters the gates leading to the mold cavity. Many foundrymen are careless about the condition of the sprue mouth on the top of the mold. Loose sand accumulates, roughness prevails, or sharp corners have not been removed.

Any or all of these may cause the washing of sand by the stream of entering metal. That sand is carried down the sprue to form defects in the casting. A sprue large enough to allow the metal to pass down with a suction that carries air with it, invariably will produce dross spots, smoke spots, defects of many kinds. After the castings have reached the inspection department, the chances are that these defects will be blamed on something else than the pouring sprue condition.

Obviously, while seeking the cause of the foregoing defects one must take into consideration the fact that scum spots, smoke spots, dross spots, seams and cold shuts, may be caused by several conditions. One is an improperly constructed sprue. Sand holes likewise may be the result of badly made sprue holes. These same defects may result from other causes. To put one's finger definitely on the cause that explains a particular defect many different causes must be investigated before one decides to make changes in the size or location of gate, size of sprue and other features. Gating or sprue size or location may have been standardized over a sufficient length of time to indicate they are correct. The cause of the defect should be looked for elsewhere.

Defects Come from Many Causes

Actually making the mold, surrounding the pattern with sand, backing the facing sand with whatever is decided upon to use, coarse sand or medium size gravel, or many other backing materials, is a highly complicated operation. Bad molding may be responsible for almost any kind of defect—smoke spots and dross, sand holes, blow holes and all the wide variety of defects that cause the foundrymen so much expense and extra effort.

Several classes of defects are caused more commonly by bad molding practice than by any other causes. Among these are scabs on the surface of the casting due to bad ramming, or the use of improper molding sand for the facing. Blow holes near the surface, particularly on the drag side, usually are caused by excessive moisture or improper permeability in the molding sand. The gases developed by the hot metal can not pass away freely. Misshapen castings result from swelling of the mold since the sand cannot support the load or force developed by the weight of metal. Possibly the mold is not rammed hard enough to support the heavy cores, or to support the weight of the metal, plus the force developed by large and heavy risers.

Swollen castings may result from the over rapping of the pattern to withdraw it from the sand. Some foundrymen consider that a swelling is part of their earning capacity, since it enables them to sell more pounds for a given number of castings on the order. This is not good foundry practice. A swollen casting, or a casting that is not true to the pattern is just as much a defective casting as if it were full of blow holes or sand spots, or the like. Modern engineering demands castings accurate to a predetermined size to enter jigs in the machine shop for rapid manipulation.

Vent Mold Carefully

Proper flask equipment enables the mold to retain its shape under all the stresses entailed by the presence of hot metal and the gases resulting from the heating of this hot metal. Bad venting of a mold is one of the faults of some molders which results in blow holes or defects of that kind. The mere stabbing of a mold with a vent wire here, there and everywhere, does not really constitute first class venting.

Venting depends on the permeability of the sand. Venting means providing definite vents or outlets located where they will do the most good. Vents leading from the vent outlets in the cores should have definite connections. Gases arising in the burning cores should have free and unrestricted outlet that cannot produce gas pressure within the mold and thus result in defects in the castings.

Venting is an item frequently neglected, particularly where there are deep pockets or lumps of sand surrounded almost entirely by hot metal. Provision for venting these lumps of sand often is not well planned. There is definite irregularity in the success of the venting and consequently an irregularity in the quality of the castings produced. Many castings are assumed to be perfect because upon being machined to the finished size no blow holes or defects show up. Defects actually may exist but they are located still further within the casting and may be the results of bad molding in the form of blow holes, or they may be shrinkage cavities due to other causes.

Considering molding sand in its relation to defective castings, the subject really includes molding sand plus binders generally used in facing sands. Choice of molding

(*Concluded on page* 90)

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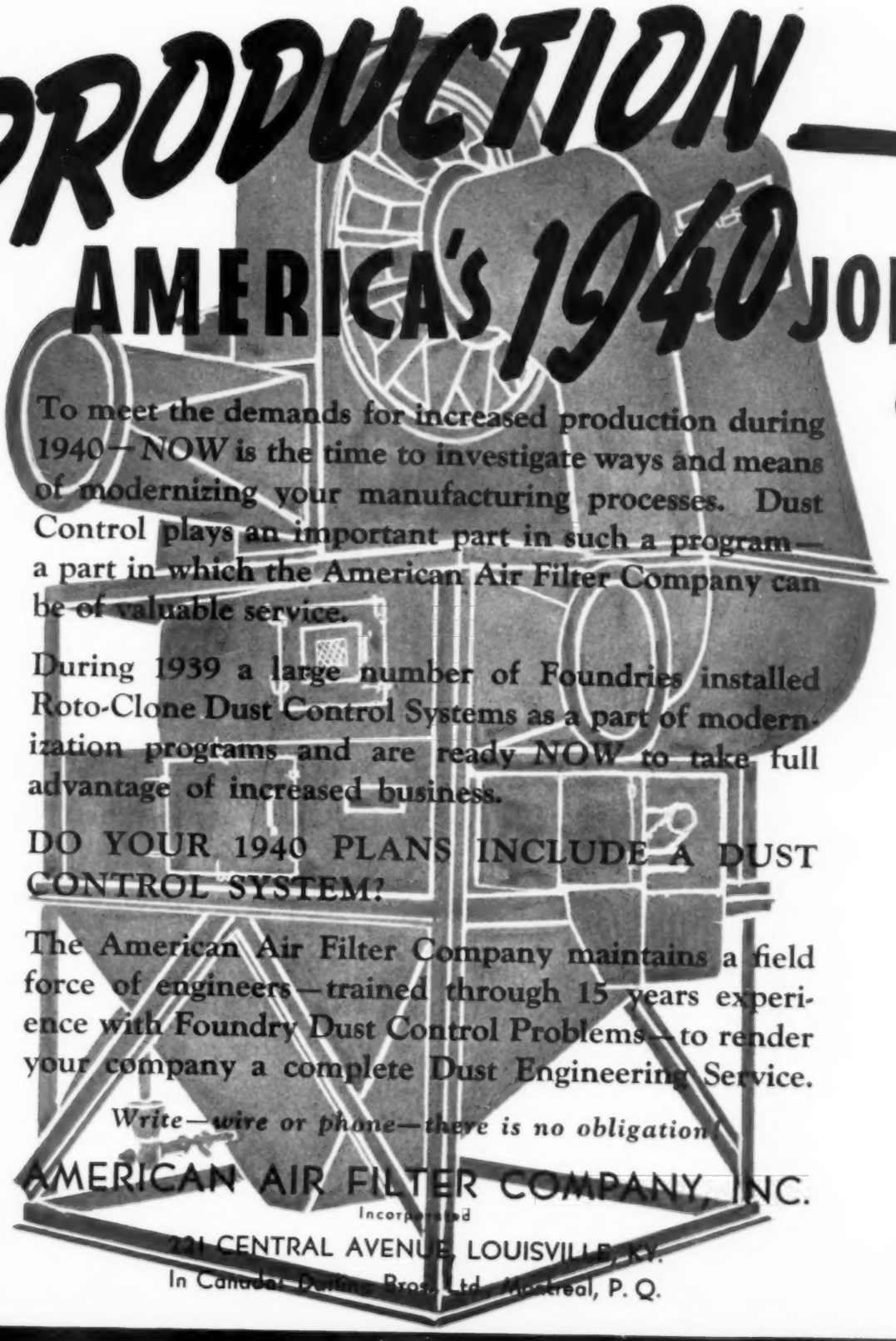

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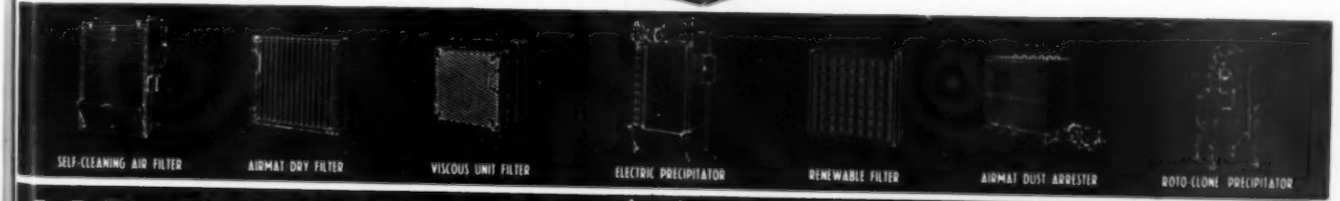

AIR FILTRATION AAF DUST CONTROL

(*Concluded from page* 88)

sand of course depends upon the type of work in hand. Amount of binder comes back also to the kind of work because this factor determines the amount of bond necessary to make a good mold from the pattern under consideration.

Defects that may be expected from molding sands plus binder include sand spots due to the washing of the sand because of the lack of binder; bad molding that has not removed sharp corners easily washed; sand spots from pieces of sand blown from the mold by improper venting or lack of permeability.

Scabbing definitely results from the wrong kind of sand surface for the type of metal and the temperature of metal in that particular mold. No. 1 Albany sand is used for many molds in the nonferrous foundry, but No. 00 is more common because it is finer and gives a better surface finish. Frequently the surface of the pattern is covered with fine No. 00 backed with the more open No. 1. Venting will be better or the permeability of the mold will be of a higher order.

Increase Venting Properties

Where gases have to pass through a very deep section of sand, part of the sand may be replaced by material even more open than molding sand. The center of the sand body may be filled with gravel, cinders or coke. The gas flow from the surface of the sand mold will be free and uninterrupted.

While the molding sands in various districts vary to such an extent that a discussion of the preferred types of molding sand is very difficult, the defects that result from the use of the different types of molding sands almost always are the same. Too much clay or other bond invariably will make the sand difficult to vent. Dirt spots, sand holes, blow holes and the like are to be expected if the right amount of permeability is not available, or an excessive amount of bonding material is present. Most bond when subjected to the temperature of molten metal develops gases of some sort. If clay is the bonding material, moisture is evaporated in the form of steam. Loam develops many gases including steam, hydrogen, carbon monoxide or carbon dioxide.

Amount of gases will influence the pressure. If the pressure is great the gases may force their way out of a poorly vented mold. If the pressure is not so great, a poorly vented mold may resist the flow of gases and they may thus be forced into the metal resulting in blow holes in the casting.

Casting defects will result from improper choice of the grade of molding sand. Grain size may be wrong. The sand may have too much bond, too much moisture, or too much of two or more of these things. Determination of bond, moisture content, and permeability are all relatively simple. Use of these different pieces of apparatus available for determining the properties of molding sand can be learned easily. The equipment does not require the employment of a highly skilled technician. There is little excuse for the lack of the use of these tools and the consequent saving resulting from intelligent choice of sands for a given type of work, as well as a consequent reduction in castings defects resulting from the erroneous use of molding sands.

This is the second of a series of articles by N. K. B. Patch, covering the causes of defects in nonferrous castings, with suggestive corrective and remedial measures. The first section appeared in the December, 1939, issue of THE FOUNDRY.

THE EDITORS.

Produces Cast Iron For Enameling

(*Concluded from page* 34)

oxygen. The bed height should be maintained at this level throughout the heat. If the bed is too low, oxygen in the air supply will not be consumed completely by coke in bed and will pass up through metal charges causing oxidation. The coke bed should be burned evenly to cherry red heat, then all air inlets should be closed to windbox, with one or two peep holes open to prevent gas explosion. The remainder of bed coke charge is leveled, then measured from charging door to get proper height of bed above tuyeres.

If necessary precaution and care are used, high temperature iron can be melted at start of heat by charging cupola about one hour before blast goes on. Heat radiated during soaking period warms the bottom and preheats the charges. Very little air should be admitted during this soaking period to prevent burning and lowering of bed, which would cause more rapid melting or lower temperature of first iron with danger of oxidation.

Placing of charges in cupola should be given proper attention. They should be level as possible, with raw materials as uniform in size, thickness and weight as can be obtained. This arrangement not only will produce hot iron, but will promote more uniform composition and faster melting rate. Iron of more uniform analysis also can be produced by use of mixing ladle which will hold at least one charge of molten metal.

In charging the cupola better results will be obtained by using definite amount of dirty sprues and gates on each charge throughout the heat. This is necessary and of interest because of the slagging effect on cupola. Some foundrymen use all gates and sprues on first charge, then home and return scrap on remainder of heat. While there is not any difference in analysis of gates and return castings, the fact is often overlooked that strong acid slag from first of heat where dirty scrap is used tends to reduce carbon. Thin basic slag tends to increase carbon pickup where other factors are the same.

Operate Cupola Continuously

No reference is made here to blast pressure, weight, air per ton or volume per minute, because these factors vary in different sizes and types of cupolas. A cupola should be operated continuously at approximately 80 per cent of rated capacity. If operated at capacity the silicon loss will be greater and will require extra silicon or additional pig iron the charge. If proper combustion conditions are maintained, any change in melting rate of the cupola must be accompanied by correction in height of coke bed. Where melting rate is decreased by supplying less air, the coke bed automatically is lowered, due to formation of carbon monoxide gas. When air supply is increased the pressure in the windbox and velocity of gases in the coke bed are increased. This raises the region containing free oxygen in cupola and requires higher coke bed to avoid oxidation of metal charges. Sand should be watched carefully and checked daily for moisture, permeability and green strength. Water and new sand should be added to keep sand heaps uniform from day to day. Obviously it would be impossible to write specifications for sand control which could be used as standard for various kinds of sand used in making enameled castings.

The cardinal principles of good molding practice for enameled castings include: Selection of proper sand with uniform grain size, uniform vent over mold surface, low moisture content, reasonable or proper permeability for type of mold rammed, ramming firm as possible with type of sand. Eliminate use of any lead facings.

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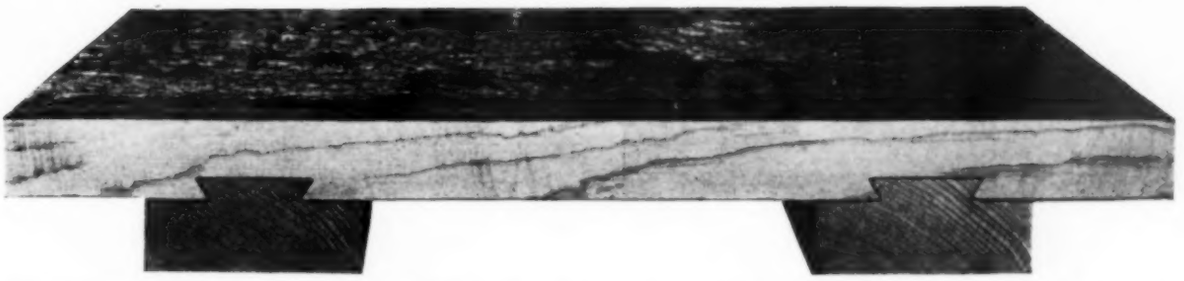

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CUT COSTS ON CAST STEEL GEARS

(*Continued from page* 30)

arm, *H* arm and various other special designs, including shrouded teeth and internal ring gears create an excessive amount of core making, handling and drying of cores, special molding and increased dry floor costs. Inauguration of the cut tooth gear has made inroads in the cast tooth field. Cast tooth gears usually are specified only in coarse pitches and installations where smooth and quiet running is not an important factor and the installations are of slow speed. Therefore, the cast tooth gearing field is rather limited and the modern jobbing steel foundry is reluctant to install special equipment and specialize in machine molded teeth under these conditions.

Coring cast teeth has been particularly beneficial when manufacturing gears of light sections and intricate designs where the foundry deems it necessary to mold in green sand, but finds difficulty in gating on account of green sand teeth. Cored teeth allow a mold to be made of green sand which collapses sufficiently under the contraction of metal. The dry sand core insures a smooth tooth surface and eliminates the washing of green sand teeth. In the majority of instances, bottom gates are used on the gear rim close to the tooth profile. A green sand tooth is liable to wash and swell with resulting sand disintegration and an unsatisfactory casting.

In some peculiar designs of gearing, although the pattern is constructed with or without a nominal amount of draft, the shrinkage and contraction of the metal pull the teeth to a slight angle. They are not perpendicularly square. The core tooth method overcomes that feature. The pattern can be provided with a core print, tapered or drafted the proper direction to allow perfect drawing of pattern, but the corebox is constructed in such a manner that when cores are inserted in molds they actually are located in a back draft position, to compensate for the contraction of metal at one location, and the contraction retarded at another.

A cast tooth internal gear ring for a power shovel is cast regularly to customer's exacting requirements allowing ⅛-inch out of roundness and 0.040-inch backlash. This cast tooth internal ring gear cast integral with roller path ring replaces a former installation of two pieces, a cut tooth internal gear and roller path casting. This casting has reduced the customer's manufacturing costs both in machining and installation. The casting is molded in green sand with individually cored internal teeth.

Occasionally steel foundries receive orders from the rubber and steel mill industry for cast tooth gears and pinions of identical design and dimensions with the exception that one gear or pinion will have one or more teeth less than the other. A substantial pattern saving is effected by the use of one corebox. The variation of tooth profile is so slight and the backlash sufficient to permit production of all items from one corebox, whereas, if orthodox patterns were considered, one would be required for each gear or pinion.

The sugar mill industry uses a large percentage of the cast tooth gearing on heavy duty, slow moving installations. Figs. 1 and 12 show views of a typical spur ring gear of cast tooth design. These gears machined and bolted to gear centers are interchangeable and are replaced quickly and conveniently. The reduced width of core print is essential to provide a sufficient amount of sand between core prints to insure accuracy in the spacing of teeth. Fig. 3 shows a pinion of similar design the coring method being identical with gear.

Used on Shrouded Gears

The molding technique outlined has proven especially successful in the manufacture of cast tooth shrouded gears and pinions as shown in Fig. 3. This particular gear used by the steel mill indusy is a driven gear for a continuous bar mill. A blank pattern eliminates a three-part molding job. This gear is typical of many others now being produced regularly in jobbing steel foundries. The same methods also have been applied to staggered cast tooth shrouded spur gears, cast tooth herringbone gears of the wobbler type and bevel gears, and has proven equally successful on all.

On cut gears of coarse pitches starting with 3-inch circular pitch or 1-inch dimetrical pitch, the gear manufacturers often request that teeth be blocked out or cast with a nominal amount of stock following the profile of tooth. A gear cast in that manner eliminates almost entirely one cutting operation known as slotting and *V* cutting of metal between teeth which requires a considerable amount of time in the gear cutter particularly on full depth involute teeth.

This introduces a foundry hazard since the sand pockets between the teeth become somewhat smaller in area due to the pattern being provided with finish. For instances on a cast tooth gear 4-inch circular pitch, tooth thickness at pitch line would be 2 inches which is equivalent to the tooth space. On a blocked out job of the same pitch on pattern with ⅜-inch stock, the thickness of tooth at pitch line is 2⅜ inches and tooth space is 1⅛ inches. Under these conditions one readily can see what happens when the sand tooth is surrounded by metal

(*Concluded on page* 94)

Section of gear showing cores, prints and teeth core in place

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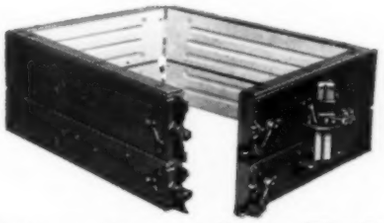

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(*Concluded from page 92*)

at a temperature of 2700 up to 2900 degrees Fahr.

The projecting sand pockets almost entirely enveloped by metal are subject to severe penetration. When made from conventional type of patterns the sand often requires days to remove. The cored tooth has proven very successful along these lines. The surface of the core is highly refractory and the interior of core being of a collapsible nature, allows it to be cleaned very readily from tooth spaces.

In addition to cast tooth gearing this practice has been used in a general way on various other types of castings, wobblers, couplings, sprocket teeth, and cored splines.

Book Review

Metal Coloring and Finishing, by Hugo Krause, cloth, 222 pages, 6 x 9 inches, published by Chemical Publishing Co., New York, and available through THE FOUNDRY, Cleveland, for $5, and in Europe by the Penton Publishing Co. Ltd., London.

This volume, which is an English translation from the second revised German edition, discusses from both theoretical and practical applications the subject of metal coloring by chemical, mechanical and electrical methods. The book is divided into five main chapters which are further subdivided to cover various phases of the main topic.

The first chapter is devoted to the concept, application and method of coloring metals. Chapter two relates to the preparation of metallic articles to be colored and treatment after coloring while chapter three describes in detail galvanic or electrolytic precipitates and some electrochemical metal coloring processes. Chapter four is concerned with chemical metal coloring processes. That chapter further is subdivided into sections covering coloring of copper and copper alloys, coloring iron and steel, coloring precious metals and alloys, coloring zinc and zinc alloys, coloring cadmium precipitates, tin, lead, nickel and aluminum and light metal alloys. The fifth and final chapter is devoted to mechanical metal coloring, as obtained by lacquers, etc.

Booklet Available

American Management association, 330 West Forty-second street, New York, recently has issued volume No. 34 in its marketing series. The booklet is entitled, "Problems Under Informative Labeling," and was prepared by F. S. Blanchard, Pacific Mills; Harold Brightman, L. Bamberger & Co., and Esther Cole Franklin, American Association of University Women. Copies may be secured from the association for 50 cents each.

Publishes Report

National advisory committee for aeronautics recently has published report No. 670 on, "Tensile Elastic Properties of 18:8 Chromium-Nickel Steel as Affected by Plastic Deformation," by D. J. McAdam Jr., and R. W. Mebs. Copies of the report may be obtained from the superintendent of documents, Washington, for 15 cents each.

"Rate of Oxidation of Steels, as Determined from Interference Colors of Oxide Film," by Dunlap J. McAdam Jr. and Glenn W. Geil, is the title of research paper R. P. 1221 recently published by the National bureau of standards. Various steels are compared with reference to resistance to oxidation, and the influence of alloying elements is discussed.

Queen City Sand & Supply Co., recently has moved to 1807 Elmwood avenue, Buffalo.

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A brand new service for both steel foundries and cast iron foundries — Sloss Standard Ferromanganese, 78/82%.

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BOSTON, MASS.

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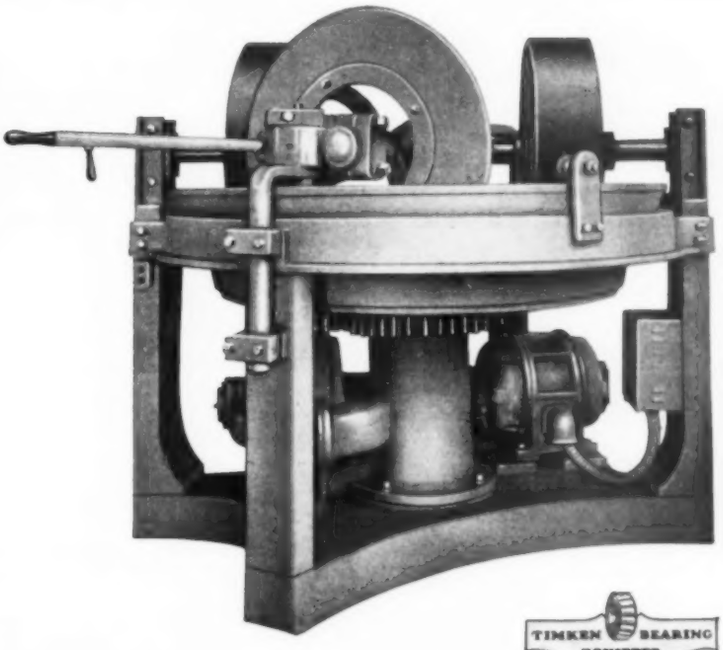

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Start the New Year right by sending for your copy today.

CLEARFIELD MACHINE CO.
Clearfield, Pennsylvania

ADVENTURES OF BILL

(*Concluded from page* 52)

town off his mental list and never has been seen in the district since. A great lad, but a little weak in the stomach.

"You may be interested in a comment I had recently from a lad who read a story in THE FOUNDRY some time ago about a 1500-pound lead casting which disappeared one night when the shop burned down. Investigators poking around in the dust and ashes and stuff next morning found that the casting had melted and the metal had run down a rat hole or something in the floor.

"My commentator figuratively snaps his fingers and says that is nothing compared to what happened in a Sheffield, England, shop when he was a young lad serving his time over there. A general impression prevails on this side of the Atlantic that the English are a staid, sober people who stick closely to the literal truth. On sundry and divers occasions—purty often to you—I have seen references to literature by American authors. Practically without exception the reviewers politely deplored the type of humor presented, based principally on gross exaggeration, vulgar horse play and rough western stuff. Thrilling adventures of Paul Bunyan, giant lumberman, and his equally giant blue ox Babe, three axe handles and plug of tobacco across the forehead, have been regarded as ridiculous rather than humorous.

"However, when the occasion arises the boys over there can go to town in telling tall stories. This old friend of mine, now domiciled in his most gracious majesty's loyal dominion of Canada takes his trusty pen in hand and deposes to wit as follows: This Sheffield shop poured a big casting in the floor. Three cranes on the job and three big ladles. The ladles were emptied without any sign of metal in the risers. The ladles were put back under the cupola spouts and three air furnaces were tapped and the metal taken over and poured into the mold. Still no sign of metal in the risers. A hurried call to another shop in the vicinity brought over all the available metal in the place. This also was poured into the mold with the same result.

"The manager—like Mark Twain's famous blue jay—declared he would fill 'er up if he had to melt every pound of pig and scrap in the yard. He was stopped by a frantic telegram from the mayor of Doncaster about 20 miles down the river: 'Hey! For the luvagod lay off your silly antics. Stream of iron in middle of river raised water to boiling point. Inhabitants of burning house scalded when firemen turned the hose on them. Surface of river covered with boiled fish. Mass meeting in town hall expressed extreme annoyance. Brewery shut down and all pubs closed. Situation desperate. Stop and this means stop.' "

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STEARNS set the pace in scientific magnetic pulley construction back in 1917?

Remember when
STEARNS introduced air cooling in magnetic pulley construction back in 1922?

Remember when
STEARNS introduced the unit one-piece integrally cast magnet body back in 1924?

Remember when
The peak loads carried by conveyor belts were made possible because of the deep, strong magnetic field provided by STEARNS HIGH DUTY Magnetic Pulleys?

STEARNS HIGH DUTY Magnetic Pulleys incorporate features which are basic in principle and magnet design. Each detail contributes to the maximum magnetic density, depth of field, uniform flux distribution and a scientific application of the elements used.

Magnetic pulleys today are as important as the conveyor in which they are used. In the STEARNS HIGH DUTY Magnetic Pulleys there is always sufficient magnetic power in reserve to handle a peak load.

Progress is born of experience and experience is your best protection. STEARNS has been building magnets for a great many years. Does this mean anything to you?

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SEPARATORS DRUMS ROLLS CLUTCHES BRAKES MAGNETS
Formerly Magnetic Mfg. Co. HIGH STEARNS DUTY
LARGEST EXCLUSIVE BUILDERS OF MAGNETIC EQUIPMENT

662 So. 28th Street Milwaukee, Wis.

Holds Examination

Competitive examinations for positions of senior inspector, inspector, associate inspector, assistant inspector, and junior inspector in ordnance material, have been announced by the United States civil service commission. Applications will be considered as received until May 22, 1940, unless an eligible register sufficient to meet the needs of the service is obtained sooner. Application forms may be obtained from the secretary, board of United States civil service commission, at any first class post office, or by addressing the commission at Washington.

CONSIDER PROBLEMS OF BUSINESS

(*Continued from page* 31)

lationships. He regards the law as fundamentally unsound and impracticable. "There is constant talk," Mr. McClintock said, "about the right to strike, but no attention is given to the most important right—the right to work. There is much acclaim about the worker's right to join a union, while nothing is said about the equal right not to join a union. Much is heard about the rights of the majority, nothing about the rights of the minority.

"If our legislators are sincere in their desire to bring industrial peace and to secure to each man the benefits of his labor, they will repeal this labor act which violates all principles of fair play, and declare it to be the government's policy that such rights are equal and will be equally protected and that no coercion from any source will be permitted."

Act Eliminates Confidence

As interpreted, the act eliminates confidence between employer and employe, he continued. "Under the rulings of the board, management, from the president down to the lowest supervisor, speaks to the employe at its peril on any matter pertaining to his work, should it in the slightest manner infer that the matter could be settled between themselves without the intervention of an outsider."

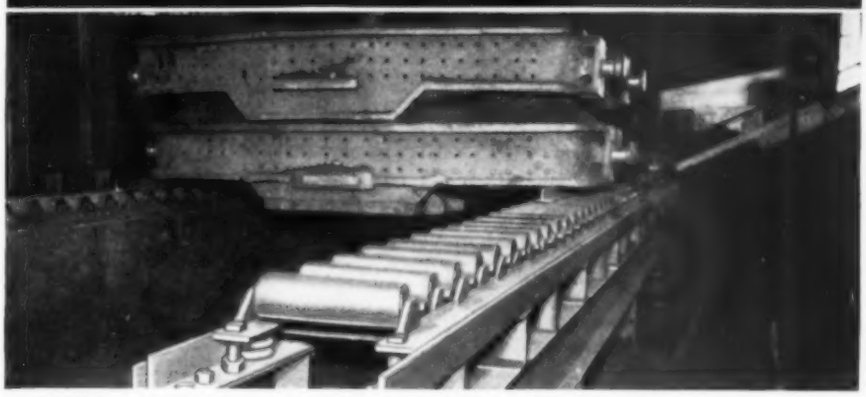
John C. Gall, counsel, National Association of Manufacturers, declared one trend in legislation was from negative to positive action. Instead of now serving as an umpire in its regulations, government has gone into the business of planned economy through which it tells the majority what to do. Another shift has been in what he called a change from external to internal regulations, and still another, a change from direct to indirect regulation and coercion. By this latter, control, not specifically permitted under existing statutes, has been obtained through various forms of taxes, senate committee investigations, etc.

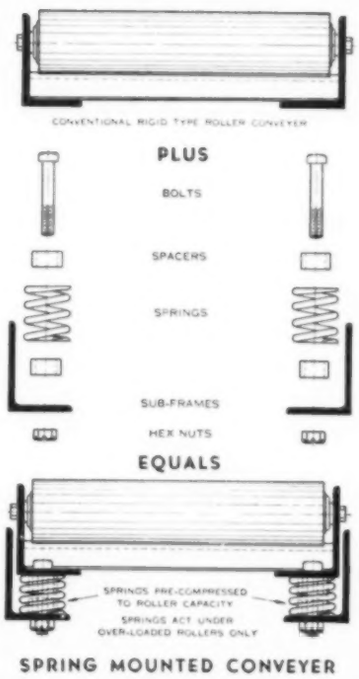
Government, Mr. Gall stated, has gained a distinct jump on business by the use of more effective catch words and symbols. This has enabled politicians to sell a poor product bearing a good label, while business, with a better product, has been unable to get public acceptance. He cited "social security" as taking first rank as a vote getting symbol. He said that he had no quarrel with the humanitarian objectives of that program, but that "it is a fact that it was sold by methods which, if employed by private industry in the sale of products, would have brought down upon industry the federal trade commission, the department of justice, and no doubt a special senate investigating committee." "'Living wage' is a perfectly respectable term," he said. "But under the guise of guaranteeing workers against exploitation and abolishing 'sweat shops' we have now embarked upon a system of governmental wage and hour fixation—not merely regulation—which has no relation to the original social concept or the declared purpose."

Despite the fact that national elections fall next year, business and industry should continue the fight for legislative reforms, according to Mr. Gall. He warned that while business at present has taken a spurt, due in part to European war influences, a solution to domestic economic and political problems continues as pressing as ever. In discussing the legislative outlook for next year, he believes there will be little reduction in spending, adding that "it would probably be another 13 billion dollar congress."

In his opinion the early days of the next session of congress will be given over largely to matters of foreign affairs and national defense, to be followed later by matters more

MATHEWS SPRING MOUNTED CONVEYERS





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THE principle is simple; the roller axles are rigidly locked in the frame as in the conventional "rigid type" construction, but the conveyer frame which retains the rollers is carried on pre-compressed coil springs. The springs are held in compression equal to the rated safe load of each roller. Under impact conditions or excessive loads the springs absorb the overload.

This construction represents the greatest improvement in roller conveyer in many years. Its application will reduce maintenance costs by prolonging the life of the equipment. When conditions are severe, "spring mounted" is the practical conveyer construction for the job.

Capacities from 150 lbs. to 8000 lbs. per roller available.

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CONTINUOUS FLOW PRINCIPLE OF HANDLING MATERIALS

pertinent to business. He stated that the so-called antitrust bills are far from being dead issues and sees a need for extreme alertness on the part of business and industry with respect to other pending legislation, and in following up needed revisions of statutes already on the books.

While the war and all of its activities means a boost for aviation and its production, the great background of the aircraft industry is every-day commercial production, according to William B. Stout, president, Stout Engineering Laboratories, Dearborn, Mich., speaker at the luncheon on Wednesday. A great revival of student and individually owned airplanes and travel has been made the basis of sales of close to 3000 airplanes this past year—selling under $3000 and some at $1500. It is estimated that 6000 of these small planes will be sold next year and 12,000 to 15,000 the year following.

Senator Millard E. Tydings of Maryland, the first speaker at the afternoon session, was introduced by Thomas W. Pangborn, president, Pangborn Corp., Hagerstown, and a past president of the association. Mr. Pangborn has been a close friend of Senator Tydings for many years. Senator Tydings pointed to the change which has taken place in government since the founding of the nation and stated that today government reaches into so many fields that its actions are a matter of concern to everybody.

In good years, business has a way of setting something aside to be used in times of poor business. Only because of the savings of the years of prosperity has it been possible for business to tide over the past 9 years. During the depression, according to the senator, all industry spent 23 billions of dollars more than was taken in, thus making a bigger contribution to the preservation of the country than did the government.

Government cannot forever continue to experiment, especially when in experimenting it uses up its substance. The senator believes that this is the opportune time for the country to determine which experiments must be modified or eliminated. The speaker emphasized the tremendous increase in the public debt, which has now reached about 45 billion dollars. In his opinion that is not going to be disastrous, but spending cannot be continued at its present pace. Interest on the debt, he said, has become enormous, amounting to 17 cents on every tax dollar taken in by the government.

Time for Men to Speak

Senator Tydings emphasized that this debt must be paid by the working men and women of America, and not by the very wealthy alone. Therefore, he feels that this is the time for men to speak up in government, business and labor circles. He stressed the importance of revising the Wagner act, so that "it is a 2-way street, and not a blind alley." He added that, in his opinion, prosperity was held back considerably by the condoning of sit-down strikes a few years ago. By condoning actions of that sort, he said, the nation was unfair to millions of men and women who were unemployed.

Discussing unemployment from its long-range aspects, Ralph E. Flanders, president, Jones & Lamson Machine Co., Springfield, Vt., outlined what he regarded the essential elements of a permanent policy for control of unemployment.

First, he said, is a federal employment service based on the present organization with its co-operating boards. The service must be expanded and improved until it is in position to give current information as to existing unemployment, its nature and its location. This would be the basis for all relief work and all employment activities.

Another element, Mr. Flanders declared, must be a program covering innumerable separate projects on which men may be employed. He emphasized these should be definite jobs "with beginnings and ends"

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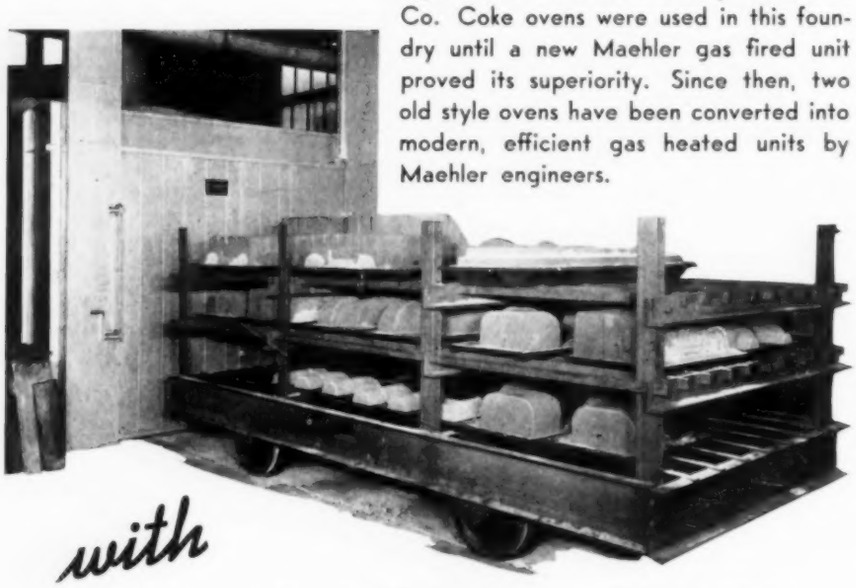
Every Bake a Perfect Bake



This Maehler car type core oven turns out a load of perfectly baked cores every night for W. A. Jones Foundry & Machine Co. Coke ovens were used in this foundry until a new Maehler gas fired unit proved its superiority. Since then, two old style ovens have been converted into modern, efficient gas heated units by Maehler engineers.

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INDUSTRIAL HEATERS AND OVENS

REDUCE baking time—be sure of absolute uniformity in every load, regardless of core shapes or sizes—lower your fuel costs—Maehler equipment will give you these advantages. Our engineers will help you select the system to solve your problem, or show you how your present ovens can be improved with a Maehler Air-Heat system. Write today.

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instead of in the form of blanket operations.

Third essential is that such work must be done as nearly as possible at normal wages and under normal conditions. The projects must also be noncompetitive with private business. He suggested the release of projects by an authorized board. Instead of making a lump sum appropriation to be spent under stress of political necessity, the release should be authorized by a board charged by congress to follow closely the pattern revealed in current figures of the employment service, Mr. Flanders stated. He proposed "an intelligent and co-operative attitude on the part of business," it being important that the program be recognized as remedial and favorable to recovery. Finally, he stressed the need for complete reversal of the present relationship between government and business.

Industrial mobilization plans were outlined by Col. F. H. Miles Jr., commandant, Army Industrial college, Washington. Planning began shortly after the World war, has been carried forward ever since. Through years of active work in industry men have been trained thoroughly in plant problems and know what to expect in the way of production needs in wartime. Industrial mobilization planning has been subject to constructive criticism of business leaders since its inception. Declaring the war resources board had done an excellent job in reviewing the plans of the army and navy, Colonel Miles voiced his opinion there would be no attempt to regiment industry in event of war.

Discuss Military Requirements

Brig. Gen. Henry J. Reilly, O. R. C., was introduced by Thomas S. Hammond, president Whiting Corp., Harvey, Ill., and former president of the association, as his commanding officer during the World war. General Reilly discussed European military requirements. An observer of much of the fighting in Spain, he said one conclusion drawn from European military operations is that airplanes and tanks simply add two more essentials to modern warfare, but do not replace any equipment previously required.

In a paper on "Powdered Metallurgy," presented Thursday morning, Gregory J. Comstock, metallurgical consultant, New York, first reviewed the history of metal powder manipulations. He stated that the art is not new, but originated early in the nineteenth century in connection with the processing of platinum. The speaker then presented skeleton descriptions of powdered processes employed in the production of platinum, tungsten, molybdenum, tantalum contact materials, porous metal bearings and the hard cemented carbides.

Mr. Comstock expressed his opinion of the importance of the developments in powdered metallurgy to various industries, and then discussed in some length the more recent applications of metal powder molding, such as the production of alnicol magnets and nonporous powder parts. He described the various factors relating to the production of oil pump gears pressed from metal powders. In answer to a question as to sources of materials, he stated that most of the powdered iron now being used comes from Sweden, where the large production of sponge iron permits the manufacture of powdered iron on an economical basis. He stated that the price of Swedish powdered iron has been as low as 7 cents per pound. Savings involved in the process of powdered metallurgy is a function of the machining required on the part formerly used, since, he pointed out, the use of pressed metal powders eliminates machining.

In the second paper, Eugene J. Benge, management engineer, Chicago, discussed the application of job evaluation to the foundry industry. The speaker pointed out that job evaluation is a systematic meth-

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od of analyzing the skills, responsibilities, physical efforts and working conditions incident to employe tasks which are paid on a time basis, usually by the hour, to arrive at the proper pay for that task. Job evaluation also is known as job rating and occupation rating.

Mr. Benge stated that job evaluation aims primarily to get company jobs in correct alignment one with another. The first step is to analyze existing jobs according to such factors as responsibility, working conditions, hazards, physical effort, skill and requirements as to age, education and experience. These factors then are valued by comparison with a predetermined measuring scale and the individual values totaled for each distinct job. Totals then are translated into dollars and cents. The speaker presented a practical example of two jobs in a machine shop. The following members were elected to district committees:

First District—Ernest F. Stockwell, Barbour-Stockwell Co., Cambridge, Mass.; G. R. Holmes, McLagon Foundry Co., New Haven, Conn.; H. B. Johnson Jr., General Fire Extinguisher Co., Providence, R. I.; R. F. Harrington, Hunt-Spiller Mfg. Corp., Boston; Franklin Farrel III, Farrel-Birmingham Co., Ansonia, Conn.

Second District—R. H. Goodwillie, Otis Elevator Co., Yonkers, N. Y.; Irving L. Jones, International Heater Co., Utica, N. Y.; P. R. Van Duyne, Meeker Foundry Co., Newark, N. J.; Hamilton Garnsey Jr., Goulds Pumps, Inc., Seneca Falls, N. Y.; C. P. Clark, Clark Bros. division, Dresser Mfg. Co., Olean, N. Y.

Third District—C. H. Hoffstetter, Odin Stove Mfg. Co., Erie, Pa.; James H. Anderson, Cooper-Bessemer Corp., Grove City, Pa.; G. L. Coppage, Pusey & Jones Corp., Wilmington, Del.; George R. Casey, Treadwell Engineering Co., Easton, Pa.; S. P. Hazard, R. D. Wood Co., Florence Pipe Foundry & Machine Co., Philadelphia.

Fourth District—C. F. Seelbach, Forest City Foundries Co., Cleveland; M. W. Manz, Ohio Brass Co., Mansfield, O.; George Cannon, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.; R. W. Gillispie, Jeffrey Mfg. Co., Columbus, O.; I. R. Wagner, Electric Steel Castings Co., Indianapolis.

Fifth District—H. E. Muchnic, Locomotive Finished Material Co., Atchison, Kans.; A. H. Head, John Deere Tractor Co., Waterloo, Iowa; C. B. Magrath, Greenlee Foundry Co., Chicago; E. L. Berry, Link-Belt Co., Chicago; E. S. Pillsbury, Century Electric Co., St. Louis.

Sixth District—W. S. Wood, Beloit Iron Works, Beloit, Wis.; C. F. Wehr, Wehr Steel Co., Milwaukee; William J. Grede, Spring City Foundry Co., Waukesha, Wis.; Fred S. Power, St. Paul Foundry Co., St. Paul; F. H. Clausen, Van Brunt Mfg. Co., Horicon, Wis.

Seventh District—A. I. Brainard, Beaumont Iron Works Co., Beaumont, Tex.; G. E. Jones, U. S. Pipe & Foundry Co., Bessemer, Ala.; Foskett Brown, Gray & Dudley Co., Nashville, Tenn.; John D. Capron, Glamorgan Pipe & Foundry Co., Lynchburg, Va.; W. C. Trout, Lufkin Foundry & Machine Co., Lufkin, Tex.

The following past presidents of the association were elected members of the council: Thomas S. Hammond, Whiting Corp., Harvey, Ill.; S. Wells Utley, Detroit Steel Casting Co., Detroit; Thomas W. Pangborn, Pangborn Corp., Hagerstown, Md.; Franklin R. Hoadley, Atwood Machine Co., Stonington, Conn.

Amsler-Morton Co., Pittsburgh, has established a department devoted exclusively to the application of pulverized coal to metallurgical furnaces. The new department is prepared to design, engineer and supervise installation of complete pulverized coal units for furnaces of all types, and will be under the direction of C. F. Herington.

THE Evercool Skimmer developed from efforts to improve malleable melting in our foundry. It has proved so much more satisfactory than the hand-made skimmers for removing slag from the bath that many foundries have taken licenses from us to use it.

The Evercool Skimmer with its water circulation through hollow head and handle can be used as long as needed to remove the slag. It saves skimming time as it need not be withdrawn for cooling or coating with fire clay. It skims the iron faster with less fatigue for the operator and better control of heats. Original equipment and normal replacements are without charge and our license agreement stipulates only a reasonable royalty.

We invite applications for licenses to use the Evercool Skimmer, protected by U. S. patents.

* U. S. PATENTS 1,763,637 1,827,503 1,827,504

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Benton Harbor Malleable Industries
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Chicago Malleable Castings Co.
Crane Company
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International Harvester Co.
Lake City Malleable Co.
Lehigh Foundries
Lockport Fittings Co.
Milwaukee Malleable & Gray Iron Works
Muncie Malleable Foundry Co.
Peoria Malleable Castings Company
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RACINE, WIS.

FOUNDRY ACTIVITIES

ADVANCE ALUMINUM CASTINGS CORP., 2742 West 36th place, Chicago, is extending its present buildings with an addition costing approximately $20,000 Roy W. Wilson is president.

* * *

American Brake Shoe & Foundry Co., Chicago, will remodel its foundry in Melrose park at an expenditure of $14,000.

* * *

Mt. Vernon, O. machine shops and foundry of the Cooper-Bessemer Corp., which have been idle since September, 1938, are being reopened.

* * *

Marshalltown Mfg. Co., Marshalltown, Iowa, is building a 1-story foundry addition, 30 x 60 feet, to be operated by Acme Brass & Aluminum Foundry, John Swab, manager.

* * *

Pullman-Standard Car Mfg. Co., Chicago, has acquired the Hammond, Ind., plant of Southern Wheel Co., unit of American Brake Shoe & Foundry Co.

* * *

Lincoln Iron Foundry, 1000 Twenty-fifth street, San Francisco, recently organized by Arthur W. Allen and Dikran Kazanjian, has purchased 40,000 square feet of land with rail and water connection in San Francisco and is erecting three modern buildings to handle jobbing and production work. Building and electrical handling system were designed by Coe Pordner.

* * *

Machine shop and pattern shop of Old Colony Foundry Co., East Bridgewater, Mass., recently was damaged by fire with an estimated loss of $50,000. Reconstruction started immediately. Charles L. Nutter is president.

* * *

Belle City Malleable Iron Co., Racine, Wis., recently signed a 5-year contract with the Walker Mfg. Co., Racine, to supply the latter organization with its entire requirements for malleable castings. The

RAW MATERIAL PRICES
Dec. 20, 1939

Iron	
No. 2 foundry, Valley	$23.00
No. 2 Southern Birmingham	19.00
No. 2 foundry, Chicago	23.00
No. 2 foundry, Buffalo	23.00
Basic, Buffalo	22.00
Basic, Valley	22.50
Malleable, Chicago	23.00
Malleable, Buffalo	23.50
Charcoal iron, furnace	27.00
Coke	
Connellsville beehive premium	$6.00 to $6.50
Wise county beehive coke	5.00 to 5.25
Detroit by-product delivered	11.00
Scrap	
Heavy melting steel, Valley, No. 2	$17.50 to $18.00
Heavy melting steel, Pittsburgh, No. 2	16.50 to 17.00
Heavy melting steel, Chicago, Auto No. 2	13.00 to 13.50
Stove plate, Buffalo	13.50 to 14.00
Stove plate, Chicago	9.50 to 10.00
No. 1 cast, mchy., New York	16.00 to 16.50
No. 1 cast, mchy., Chicago	15.00 to 15.50
No. 1 cast, Pittsburgh	19.50 to 20.00
No. 1 cast, Philadelphia	20.50 to 21.00
No. 1 cast, Birmingham	15.50 to 16.00
Car wheels, iron, Pittsburgh	21.00 to 21.50
Car wheels, iron, Chicago	17.00 to 17.50
Railroad malleable, Chicago	18.50 to 19.00
Malleable, Buffalo	19.50 to 20.00
Nonferrous Metals	**Cents per pound**
Castings copper, refinery	12 37½
Straits tin	50.25
Aluminum, 99 per cent	20.00
Aluminum, No. 12 (Secondary, standard)	15.00 to 15.50
Lead, New York	5.50
Antimony, New York	14.00
Nickel, electro	35.00
Zinc, East St. Louis, Ill	6.00

WANTED!

NOTHING BUT A GOOD FLOOR ON WHICH TO OPERATE!

this **BROSIUS** self-contained **AUTO FLOOR CHARGING MACHINE** requires no tracks or costly runways

■ Built in capacities of from 2,000 to 20,000 lbs., the BROSIUS Auto Charger serves Open Hearth and Electric furnaces, hammers, presses, mills, etc. Designed with three wheels, it can turn on its own wheel base, and is excellent for operating in congested areas. We invite you to investigate its possibilities.

EVERY CRANE A BUCKET CRANE WITH BROSIUS SINGLE HOOK GRAB BUCKETS

The BROSIUS single hook grab bucket operates in minimum headroom. By throwing the hook block of the bucket over the hook of the crane, your ordinary crane becomes a bucket crane. They are tripped by a hand line, either from the ground or the operator's cage. Simple in construction, they are effective in use.

EDGAR E. BROSIUS, INC.

DESIGNERS & MANUFACTURERS PITTSBURGH | SHARPSBURG BRANCH | PENNSYLVANIA

Walker company is undertaking an expansion program and will utilize the present foundry building for other manufacturing purposes.

* * *

Index of foundry equipment orders for November, according to a report of the Foundry Equipment Manufacturers' association, Cleveland, was 192.2 as compared with 220.4 in October, and 89.7 in November, 1938. Index of shipments was 170.1 as compared with 170.7 in October, and 94.5 in November, 1938.

* * *

Flury Foundry Co., Lancaster, Pa., has been organized by Alfred C. and Calvin K. Flury, both formerly with the Lancaster Malleable Casting Co., Lancaster. Alfred C. Flury was connected with the latter company for 22 years as foreman of pattern shop and foundry superintendent. New equipment has been installed in both pattern shop and foundry. The company will manufacture brass, bronze, and aluminum castings.

Dust Collector

H. A. Brassert & Co., 310 South Michigan avenue, Chicago, has developed a stationary type disintegrator, a variation of the device originally designed for washing blast furnace gas. The new air washer is applicable, it is claimed in the foundry to cleaning exhaust air from pressure blasting machines, tumbling barrels, shakeout stations and other sources of dust. Operating data on one installation showed: Volume of air handled, 2400 cubic feet per minute; temperature of air, in, 150 degrees Fahr.; temperature of air, out, 80 degrees Fahr., and saturated; volume of water 24 gallons per minute; dust content, in, 20 grains per cubic foot; screen analysis of dust 70 per cent through 325 mesh; dust count of air, out, 4,000,000 particles per cubic foot between 2 and 10 microns; operating cost approximately 2 horsepower per 1000 cubic feet of treated air.

The disintegrator unit is adjustable to air pressure drop and velocity, and to water pressure and volume. By these adjustments, it is stated, it is possible to secure a practically complete removal of all dust in the inlet air or any portion thereof. The device is based on the principle of producing a concurrent flow of air or gas and of finely divided water at high velocity with impingement on a surface at right angles to the direct of concurrent flow. A typical unit, shown in the accompanying illustration, consists of a venturi shaped nozzle which carries an integral socket shaped support for a high pressure nozzle arranged to throw a solid stream of finely divided water with an angle of dispersion that completely fills the throat of the venturi tube. The mixture of air or gas and water impinges on a baffle plate cone provided with two rows of staggered teeth.

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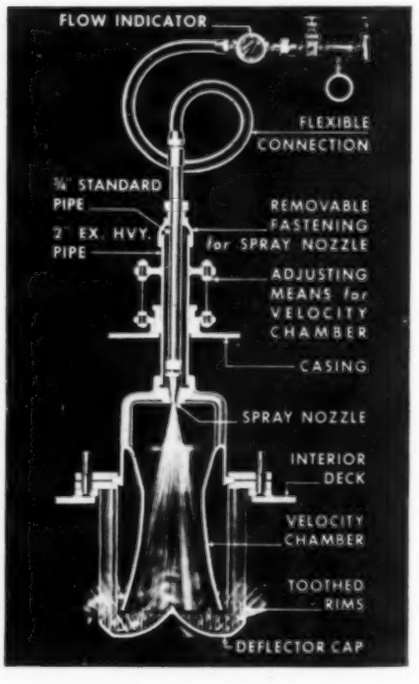
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